Deciding when driving should stop:

A validated measure of driving competence, not diagnosis, needs to be the criterion

Allen R. Dobbs, PhD
Founder & President
DriveABLE Assessment Centers
Professor Emeritus
Psychology, Neurosciences, Adjunct Prof. Medicine
University of Alberta

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Valuable Advances from the AMA Guide

- A call to action: Important injury prevention, public health, and public safety challenge.
- Clear acceptance: Central role of physicians by AMA.
- Defines involvement: Primary care physician should identifying medically at-risk patients who need further evaluation.

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

AMA Process

Physician's Plan for Older Drivers' Safety (PPODS)

Initial screen

Observation

Note red flags (conditions/medications)

Review systems

Family concerns

If positive, assess functional outcome, e.g., ADReS

ADReS

Screen developed on basis of clinical judgment of experts—but not validated

Vision

Visual Fields

Range of Motion

Rapid Pace Walk

Motor Strength

Trails B

Clock Drawing

"The individual tests in ADReS have been validated as measures of their particular function and in some cases have been studied with relation to driving." [p34]

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

AMA Process

Physician's Plan for Older Drivers' Safety (PPODS)

Initial screen

Observation

Note red flags (conditions/medications)

Review systems

Family concerns

If positive, assess functional outcome, e.g., ADReS

Driving Evaluation **– Driving Decision Criterion**

Critical life-changing Driving Decision decisions really do is too important deserve the move to to be left to science-based clinical judgment decision making

DriveABLE
Driven by Research

Evaluating the Medically at Risk Driver

The Move to Science-based Driving Evaluations

- What is needed for science?

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Step 1: Develop science-based driving competence criterion

Analogy: Develop science-based diagnosis criterion

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Step 2: Maximize safety of evaluation for driver and public

D[redacted]the
r[redacted].

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Step 3: Determine (not presume) applicability to both Urban and Rural driving communities

Research must confirm fairness and effectiveness for Urban and Rural drivers

DriveABLE
Driven by Research

Evaluating the Medically at Risk Driver

Step 4: ‘Package’ the evaluation in a manner that it can be delivered in different places.

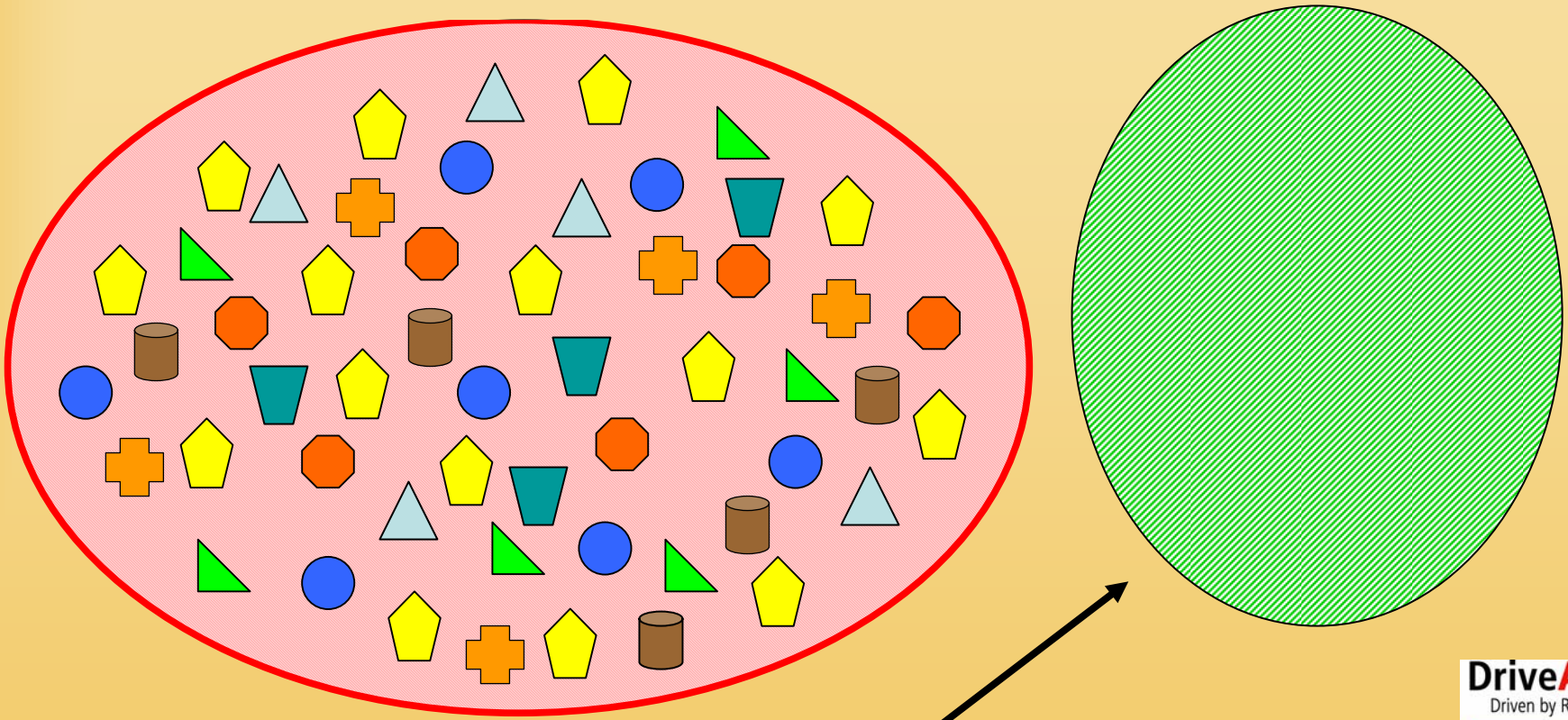
Brings in new issues:

- Standardization across sites
- Quality assurance monitoring

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

The Science: What to Score?

Driving errors of medically impaired drivers.
Which are competence decline indicators?



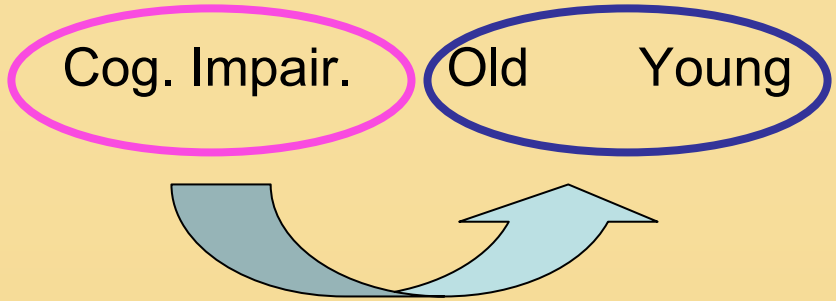
Driving evaluations that score these driving errors are discriminatory

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Differentiating the Driving Errors

Category

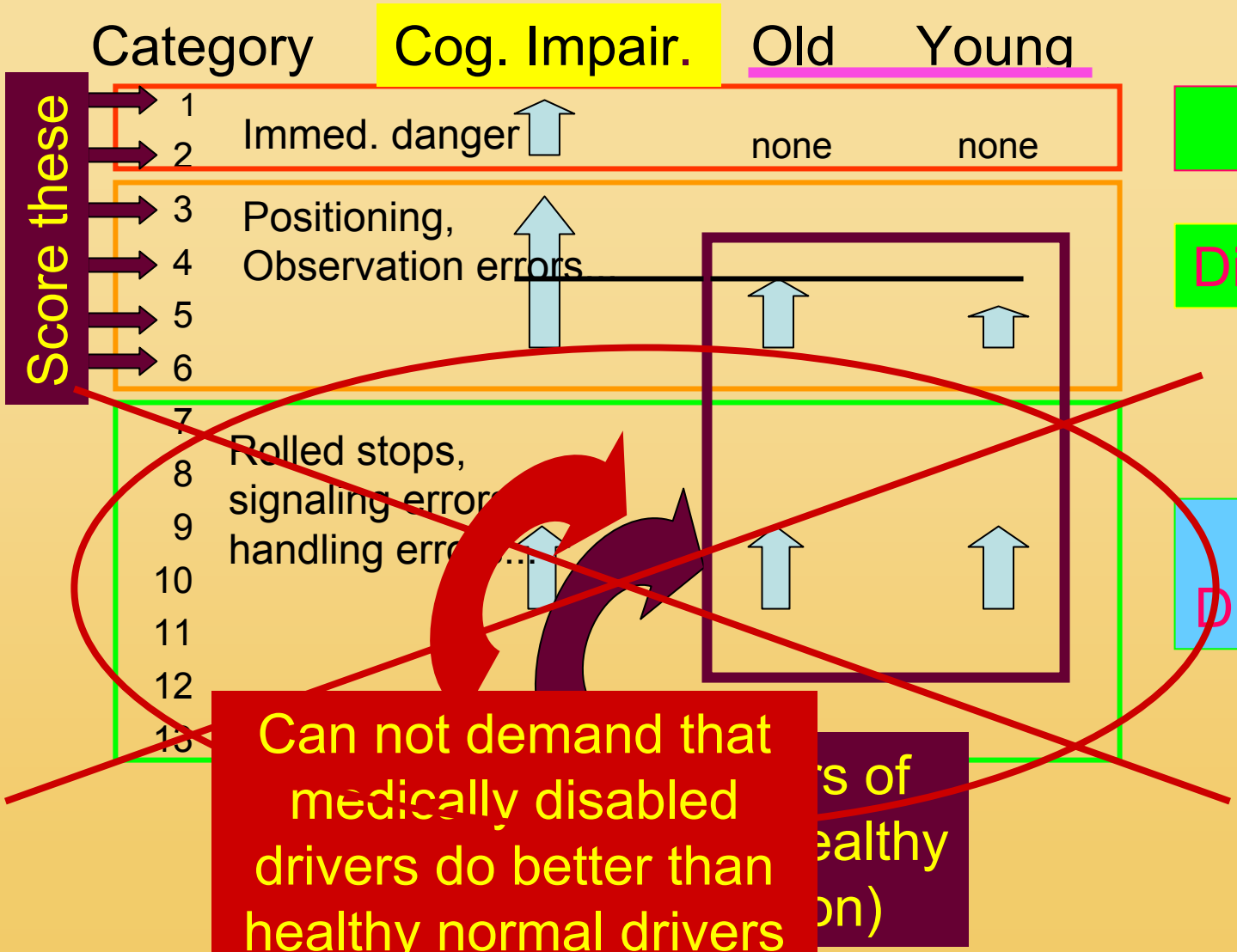
1
2
3
4
5
6
7
8
9
10
11
12
13



Comparison isolates and defines the errors of cognitively impaired, unsafe, drivers.

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Differentiating the Driving Errrors



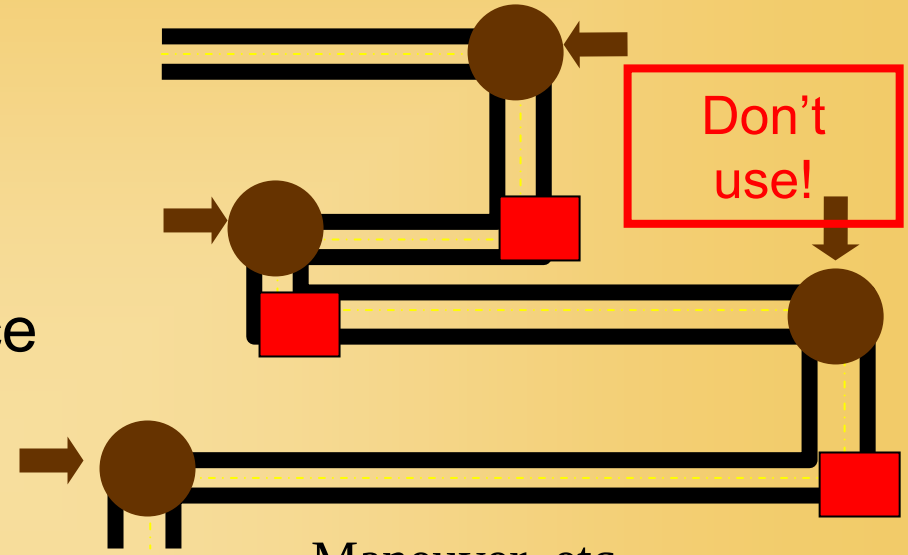
DriveABLE
Driven by Research
Evaluating the
Medically at Risk Driver

Defining an Effective Road Course

1. Plot out the road course.

2. Identify where the competence defining errors occurred.

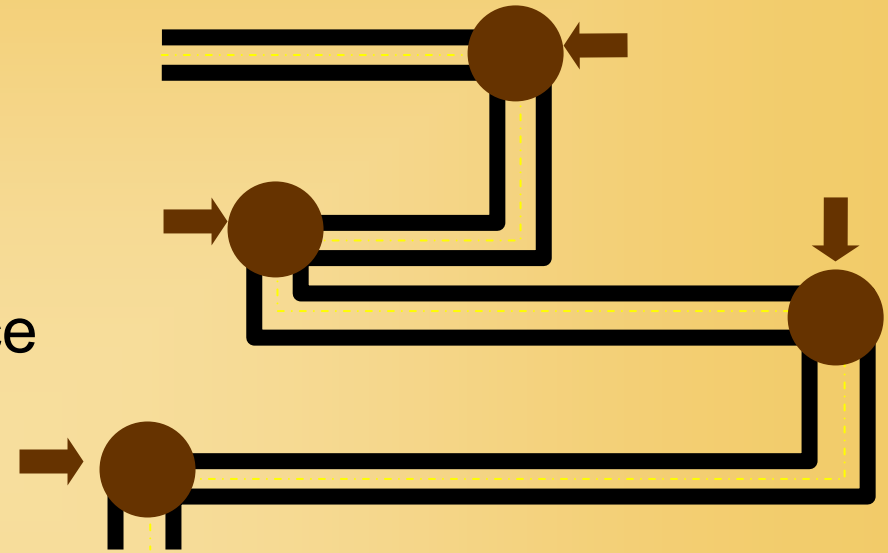
3. Identify road and other conditions associated with these error locations.



Maneuver, etc.
Lanes
Speed
Controlled/Uncontrolled
Visual Conditions
etc.

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Defining an Effective Road Course



1. Plot out the road course.

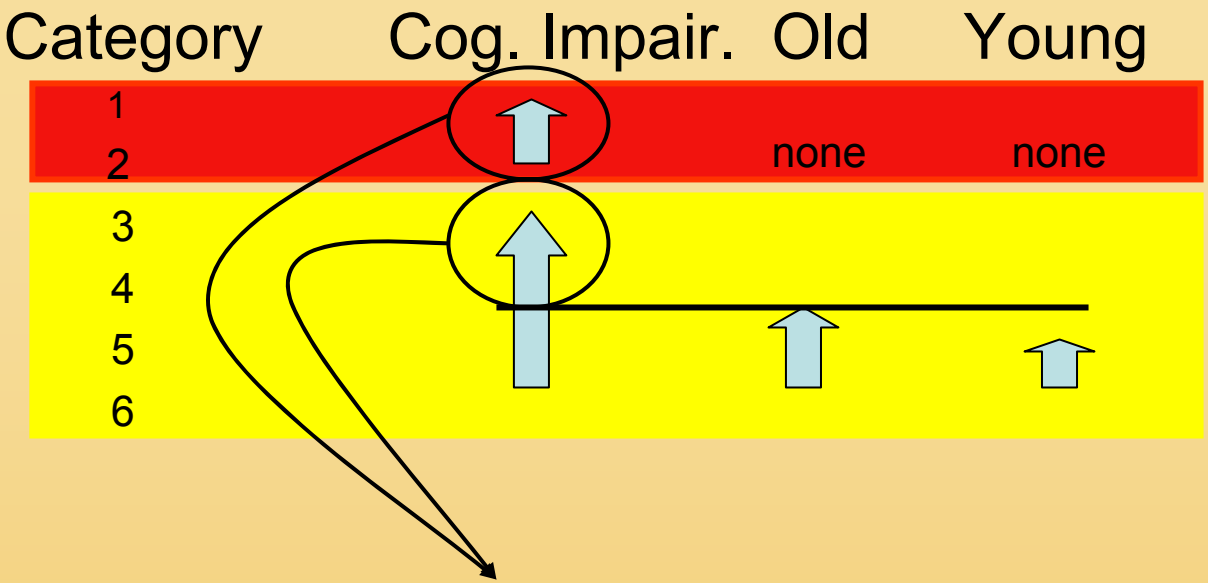
2. Identify where the competence defining errors occurred.

3. Identify road and other conditions associated with these error locations.

4. Define rules to enable replicating the road conditions that effectively reveal the competence defining errors for medically impaired drivers.

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Unsafe Driver Criterion



Criterion

Discriminating

Driving errors differ in frequency and severity and/or type from those of normal experienced drivers.

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Step 1 Completed: Road Test Developed

- Road course: maneuvers and road conditions that reveal competence defining driving errors.
- Scoring: only driving errors that differentiate cognitively impaired unsafe drivers from normal experienced drivers.
- Criterion: type, frequency and/or severity of driving errors that differentiate cognitively impaired driver from competent, experienced drivers.

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Step 2: Increase Safety

Develop In-Office testing that identifies at least the most dangerous drivers without the need for in-car testing on public roadways.

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Identifying the Test Battery

Three data sets available from all three groups

- Neuropsychological test data
- Rehabilitation Medicine test data
- Research (complex task) data

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Selecting Tests

Select tests to maximize predictive validity of the Battery.

Test A

Test B

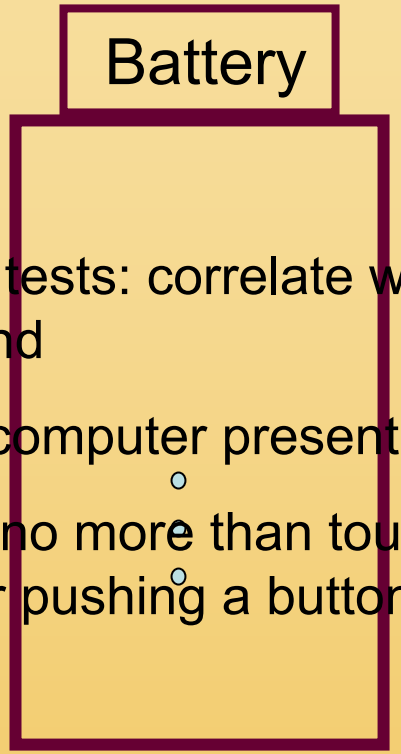
Test C

Test D

Test E

Test F

Test G



Best Driving Predictor

Adds Most Prediction

Adds Most Prediction

Candidate tests: correlate with observed driving and

- Can be computer presented/scored
- Require no more than touching the screen or pushing a button

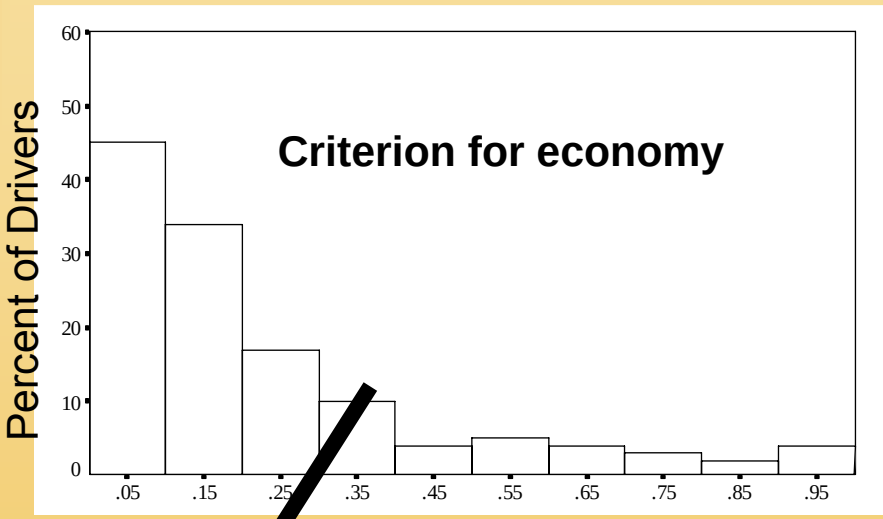
The outcome score is 'predicted probability of failing the Road Test'

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

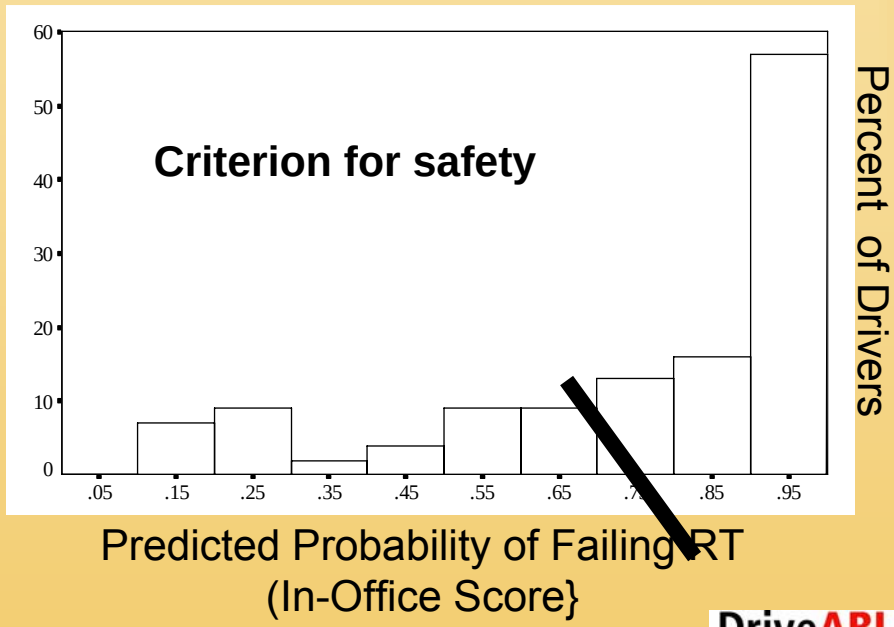
In-office vs Road Test Scores

Setting the In-Office Performance Criteria

Predicted probabilities of Failing the RT for Drivers Who **Passed RT**

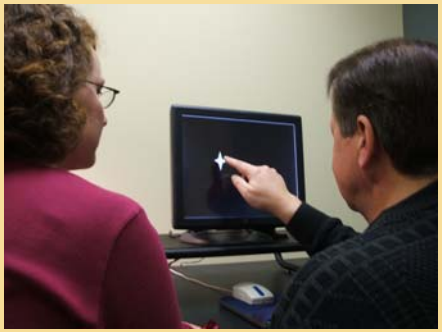


Predicted probabilities of Failing the RT for Drivers Who **Failed RT**



DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Setting the In-Office Criteria



Need Road Test to resolve competence

Economic Enhancement

Low Cutoff

High Cutoff

Safety Enhancement

Pass

In-Determinant

Fail

Low Score (0)

High Score (1)

Predicted Probability of Failing the RT
(In-Office Assessment Score)

DriveABLE
Driven by Research

Evaluating the Medically at Risk Driver

Validation Study

- Extended new sample inclusion criteria to include drivers:
  - From across driving age range
  - With other medical conditions that result in generalized cognitive decline.

    (Including: Cardiac disease, COPD, Renal disease, Diabetes, Stroke, CVA, Psychiatric illness)
  - Referrals from community physicians as well as specialists

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Step 3: Urban & Rural Drivers

Research to determine applicability to both Urban and Rural driving communities

Matched samples of urban and rural drivers on age, sex, diagnosis, level of cognitive impairment (MMSE).

Examined p/f rate of the urban and rural drivers.

Found performance of two groups not different (2% difference)

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Step 4

Knowledge transition:

Research ➡ Practice

AHFMR, NRC assisted in development of University of Alberta spin-off company -- DriveABLE

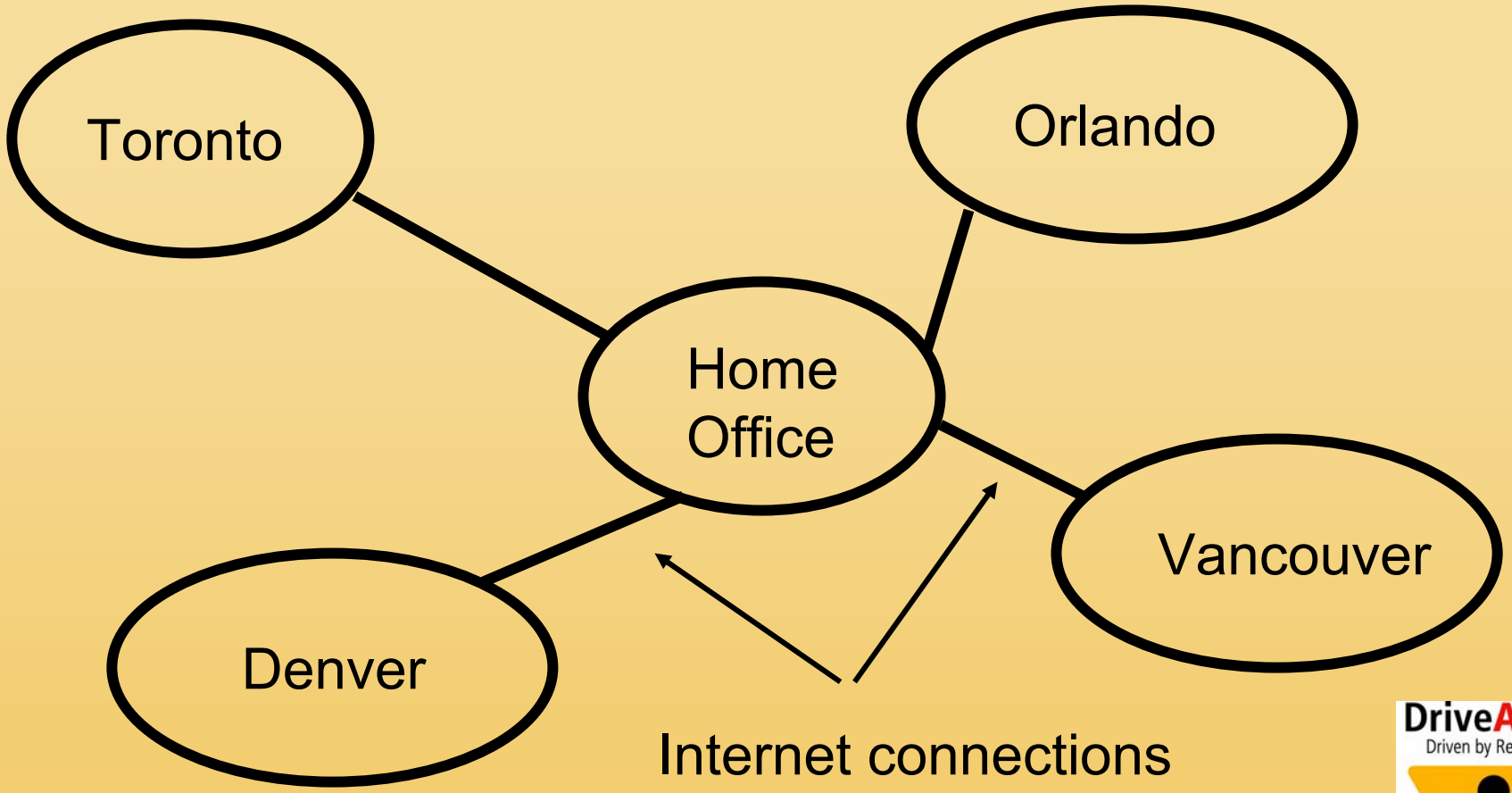
'Package' the evaluation in a manner that it can be delivered in different places.

New issues:

- Standardization across sites
- Quality assurance monitoring

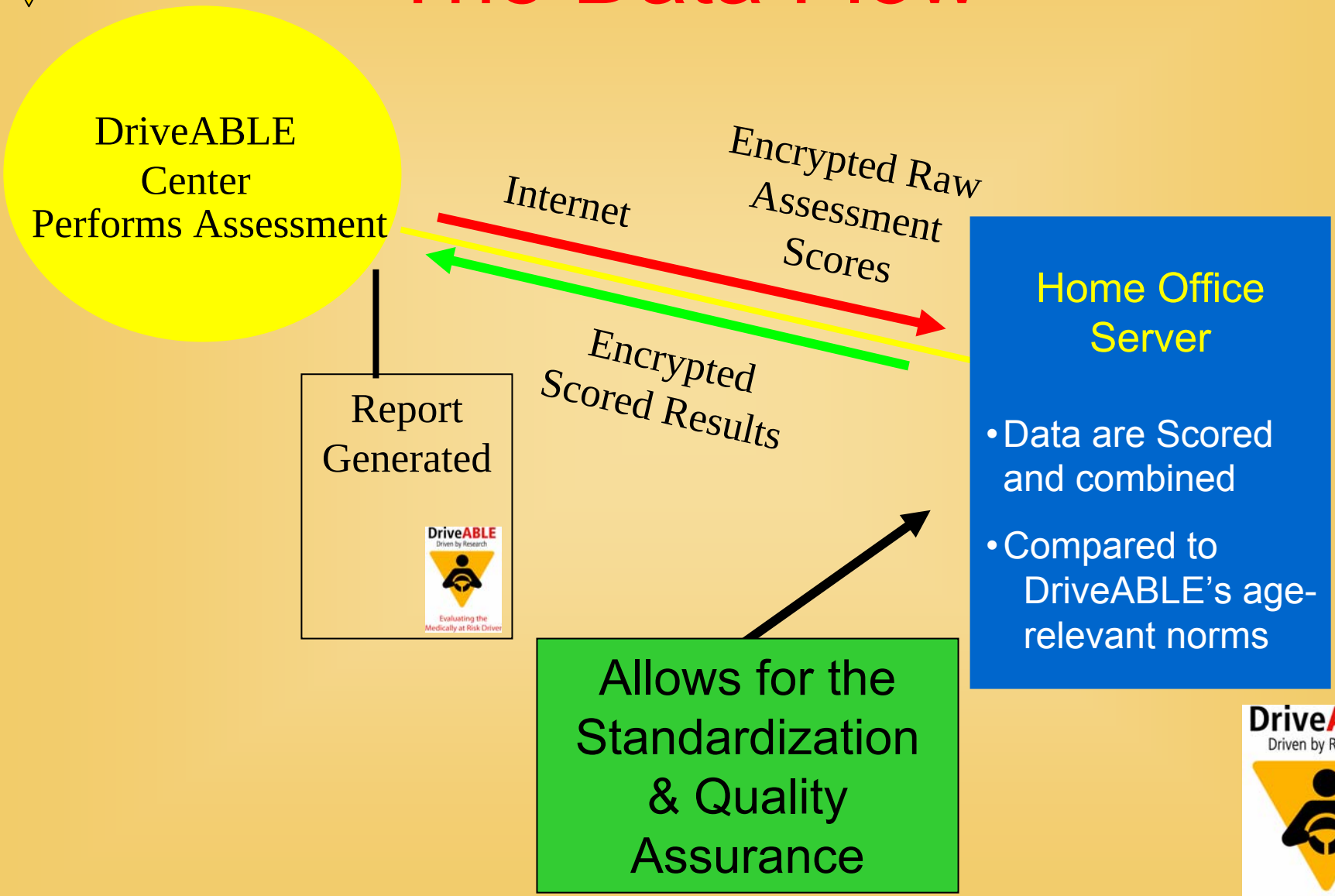
DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

RT Quality Assurance Model



DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

The Data Flow



Standardization

What is it?

- Equal evaluation process
- Equal outcome for drivers of equal ability

  (across evaluators, and across sites)

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Why Standardization in Driving Evaluation?

- Issue is fairness and consistency for all drivers.
  - Evidence for licensing decision should be the same for all drivers,
    - regardless of where tested or by whom
- How can license suspension be justified if the person would be able to retain driving privileges if he/she went to a different evaluator?
- Assessment ‘shopping’ is not an attractive alternative.

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Standardization

- Requires road courses of equal difficulty across multiple sites
  - virtually impossible.
- Measure and equate road course difficulty:
  - Requires external criterion with known relationship to driver performance on a standard road course.
- The pass/fail criterion then can be adjusted to accommodate the course difficulty.

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Standardization

Difficulty determination requires an external standard.

Computerized assessment, known relationship to RT

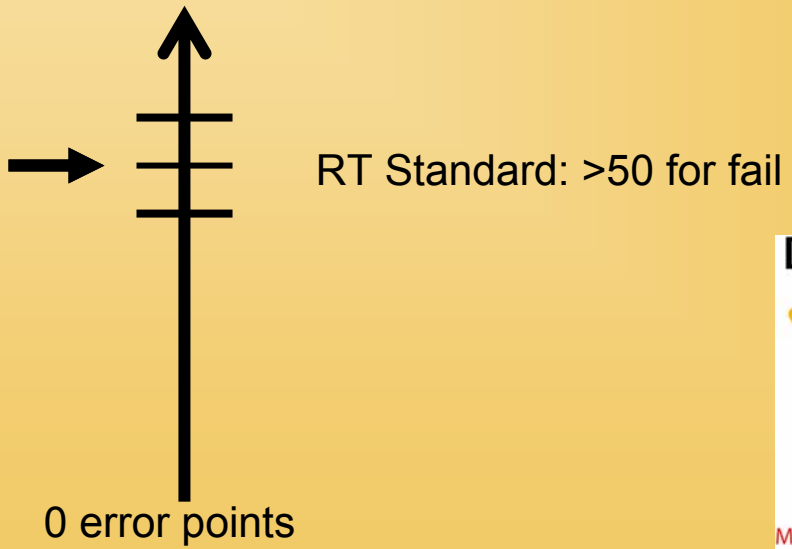
Determine course difficulty,

then calibrate the RT pass/fail criterion to accommodate differences in difficulty compared to the standard.

Equal outcome for like clients is goal of standardization.

New Road course A:
Fail rate **higher** than predicted from external criterion.
More difficult than standard RT.

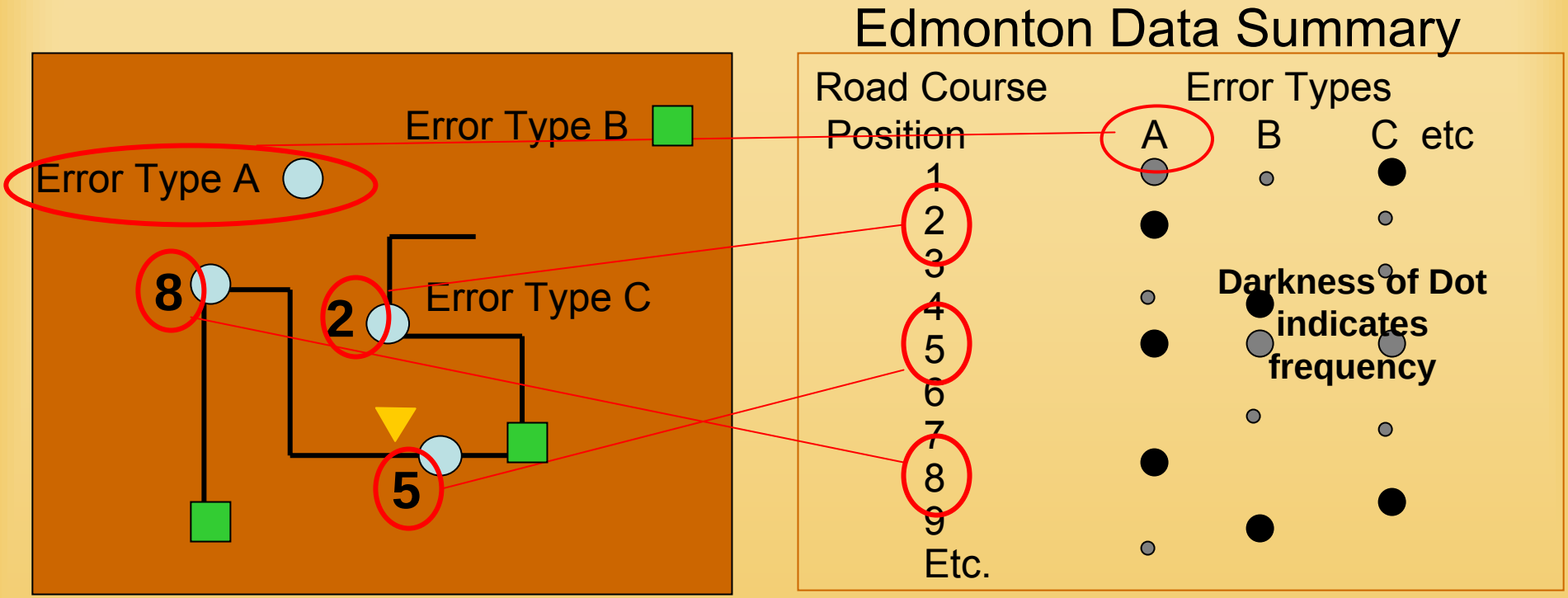
New Road course B:
Fail rate **lower** than predicted from external criterion.
Less difficult than standard RT.



DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Monitoring Quality Assurance

Example: Driving Evaluator Scoring of Error-types:



DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Policy Implications

Best Practice Model

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Categories of Medical Conditions: Based on Condition Outcome of Relevance to Driving

Sporadic Outcome	**Chronic** outcomes	
Sporadic outcome is debilitating [e.g. Seizure, Unstable Cardiovascular diseases, Sleep Disorders, Diabetes (hypoglycemic reaction)]	**Chronic severe physical impairment outcomes** [e.g., paralysis due to stroke, spinal cord injury, loss of limb]	**Chronic cognitive impairment/minor physical outcomes** [e.g., Dementia, COPD, Renal Disease, Diabetes Mellitus, Head injury, includes outcomes where there are co-morbidities, poly pharmacy, and arthritis, peripheral neuritis]
Evaluating driving competence during debilitating event not necessary. Question concerns prediction of occurrence of debilitating event.	Outcome ongoing, impairment for driving ongoing Question concerns vehicle adaptation, training potential	No need to predict the occurrence of the potentially impairing event: Impairment is ongoing and therefore measurable. Question concerns driver competence given the chronic impairment.
Science to predict occurrence not available.	Science for adaptive devices not available	Science to evaluate driver competence is available.
Best Practice = Consensus Guidelines	**Best Practice = Clinical Judgment**	**Best Practice = Science-based driver evaluation**

DriveABLE Acknowledges Contributions

- Alberta Heritage Foundation for Medical Research
- (Research Program and Technology Commercialization Program)
- Alberta Health Sciences Research and Innovation Fund
- Canadian Aging Research Network: Centres of Excellence
- Northern Alberta Regional Geriatric Program
- University of Alberta
- Alberta Mental Health Research Fund
- National Research Council of Canada (IRAP Program)
- Health Canada
- Alberta Motor Association
- City of Edmonton
- Edmonton Telephones (now Telus)

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver


DriveABLE
Driven by Research
Evaluating the
Medically at Risk Driver

Monitoring Quality Assurance

1. In-Office Assessment Administration: Evaluate the relationship among the 6 tests of the In-Office testing: Must remain the same.

2. On-Road Evaluation -- Standardization: Calibrated relationship between External Criterion and Road Test outcome must be maintained.

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Monitoring Quality Assurance

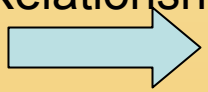
3. Driving Evaluator's judgment standard.

After every drive, driving evaluator makes ratings.

Evaluators Ratings of Facets

- Left turning
- Right turning
- Defensive Driving
- Etc.

Evaluate Relationship



Evaluators Error Severity Ratings

- Turning errors
- Positioning errors
- Observation errors
- Etc.

DriveABLE
Driven by Research

Evaluating the Medically at Risk Driver

Road Course Standardization

Almost without exception, the difficulty of any two road courses will differ in difficulty.

Questions:

- How would you know?
- What could be done to equate?

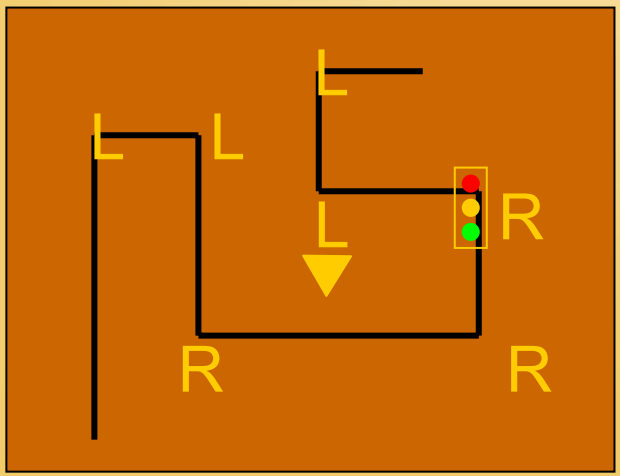
DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Standardization

Many road courses will differ in difficulty even when carefully laid out in terms of strict criteria.

Calibrated relationship between External Criterion and Road Test outcome *must be maintained*. Periodic monitoring ensures continued standardization.

External Criterion
Equal at all sites, known relationship to RT



Relationship must match standard, relationship needs to be maintained.

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

The Standardization Process

- To evaluate difficulty,
- need an *external criterion* against which each road course can be evaluated.

Criterion requirements:

- Must have been shown to be related to driving
- Evaluate same drivers as take road test.
- Must be identical test for all drivers across all sites.

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

DriveABLE's External Criterion

- DriveABLE has an In-office Assessment.
- Always the same at each site.
- External to the road test.
- Relationship between Competence Assessment and Road Test performance has been determined.

- Initially, all clients complete both the In-Office Competence Assessment and Road Test .

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Measuring Road Course Difficulty

- Given the performance on the Competence Assessment for a group of clients:

- a) If the fail rate is too high, the RT is more difficult than the standard and the points needed to fail (driving errors plus severity) is adjusted upward to accommodate the higher difficulty.

- b) If the fail rate is too low, the RT is less difficult than the standard and the fail criterion is adjusted to accommodate the lower difficulty (fewer driving error points required to fail).

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

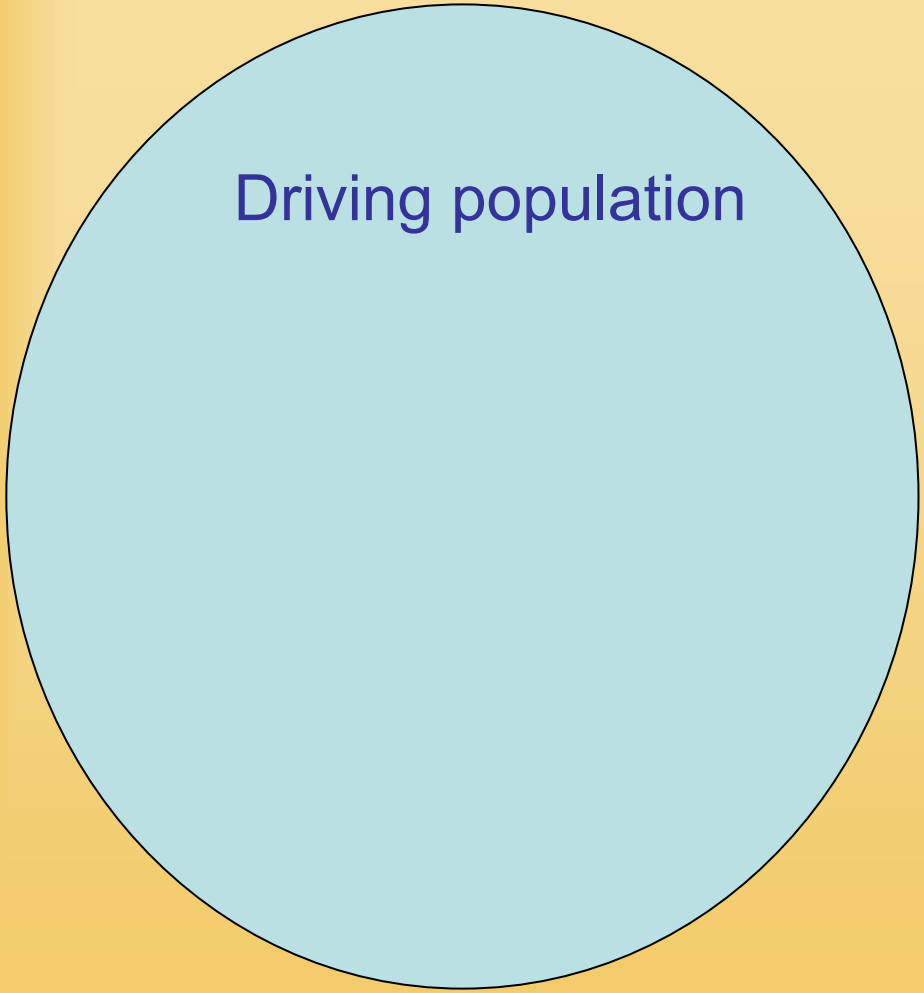

DriveABLE
Driven by Research
Evaluating the
Medically at Risk Driver


DriveABLE
Driven by Research
Evaluating the
Medically at Risk Driver


DriveABLE
Driven by Research
Evaluating the
Medically at Risk Driver

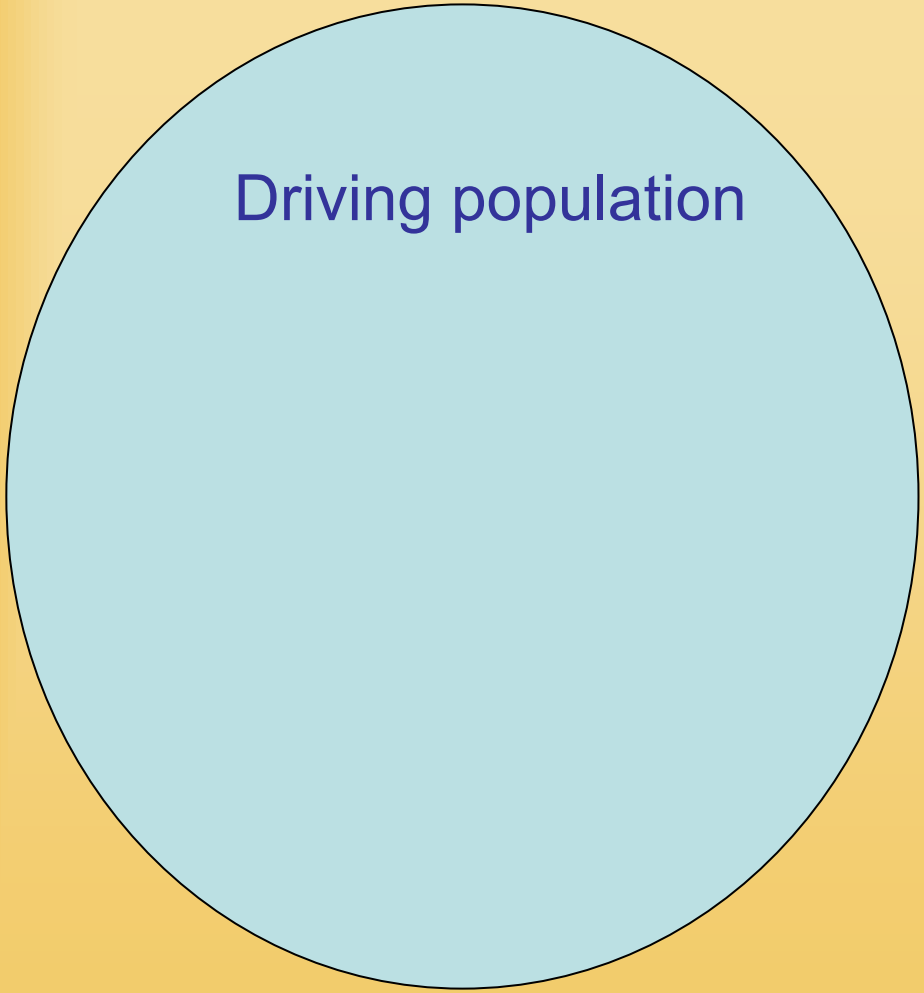

DriveABLE
Driven by Research
Evaluating the
Medically at Risk Driver

The Process



DriveABLE
Driven by Research
Evaluating the
Medically at Risk Driver

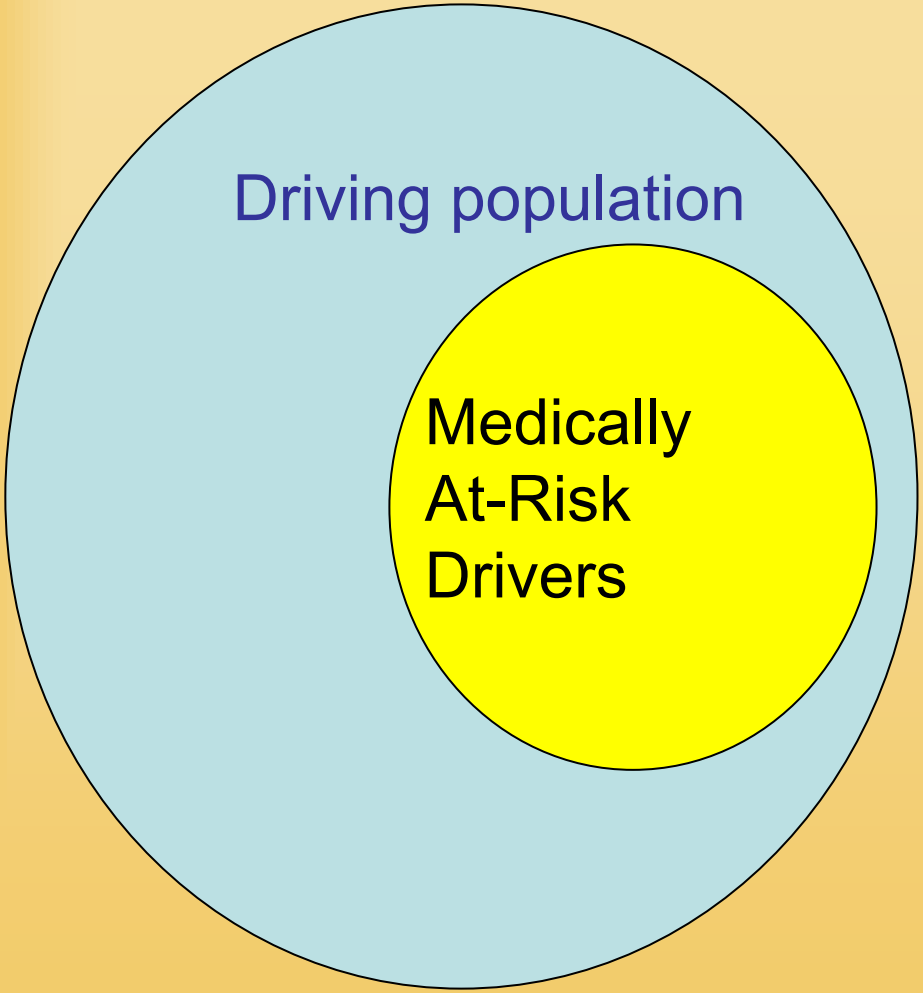
Physician Role



DriveABLE
Driven by Research

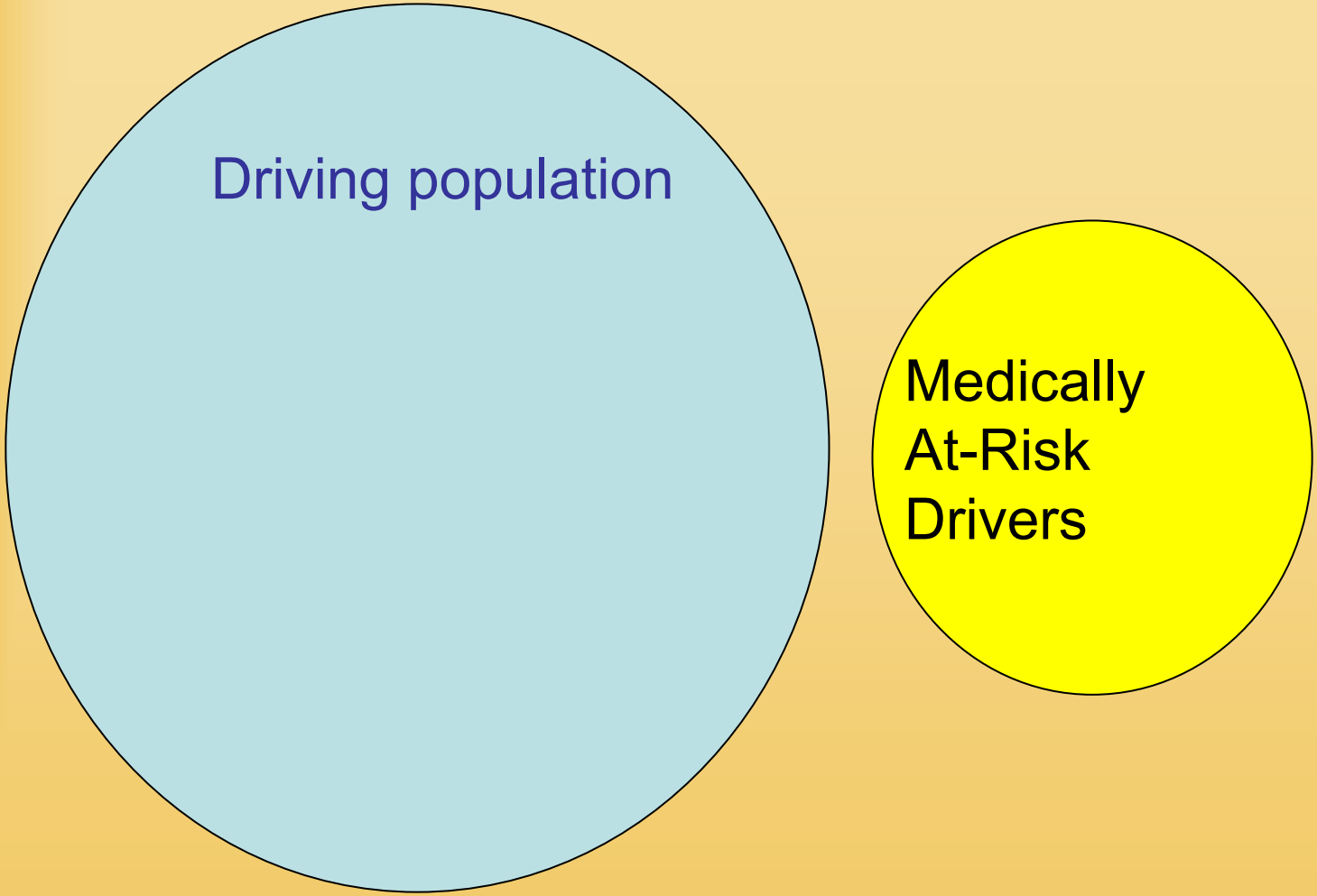
Evaluating the
Medically at Risk Driver

Physician Role



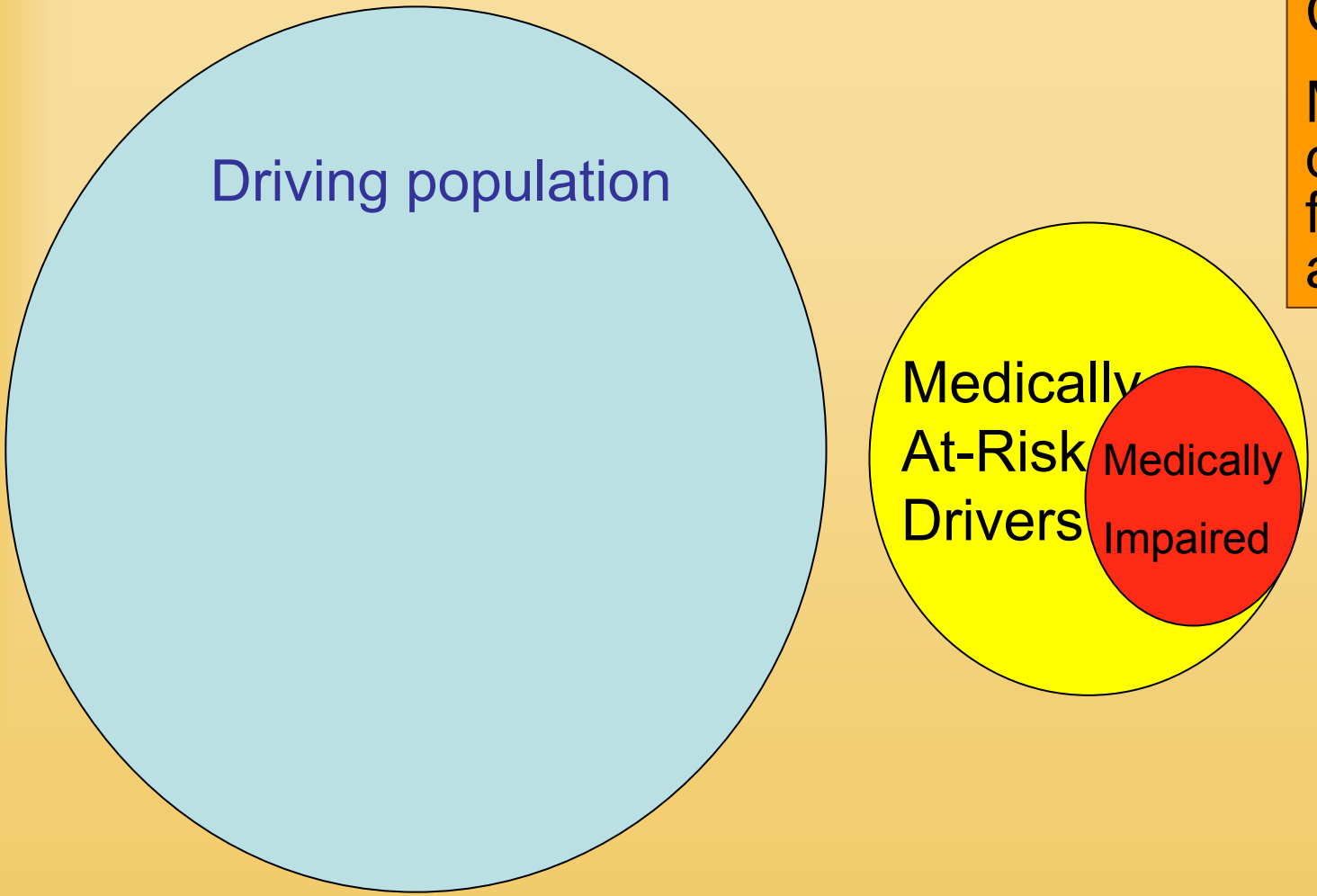
DriveABLE
Driven by Research
Evaluating the
Medically at Risk Driver

Driving Evaluation



DriveABLE
Driven by Research
Evaluating the
Medically at Risk Driver

Driving Evaluation



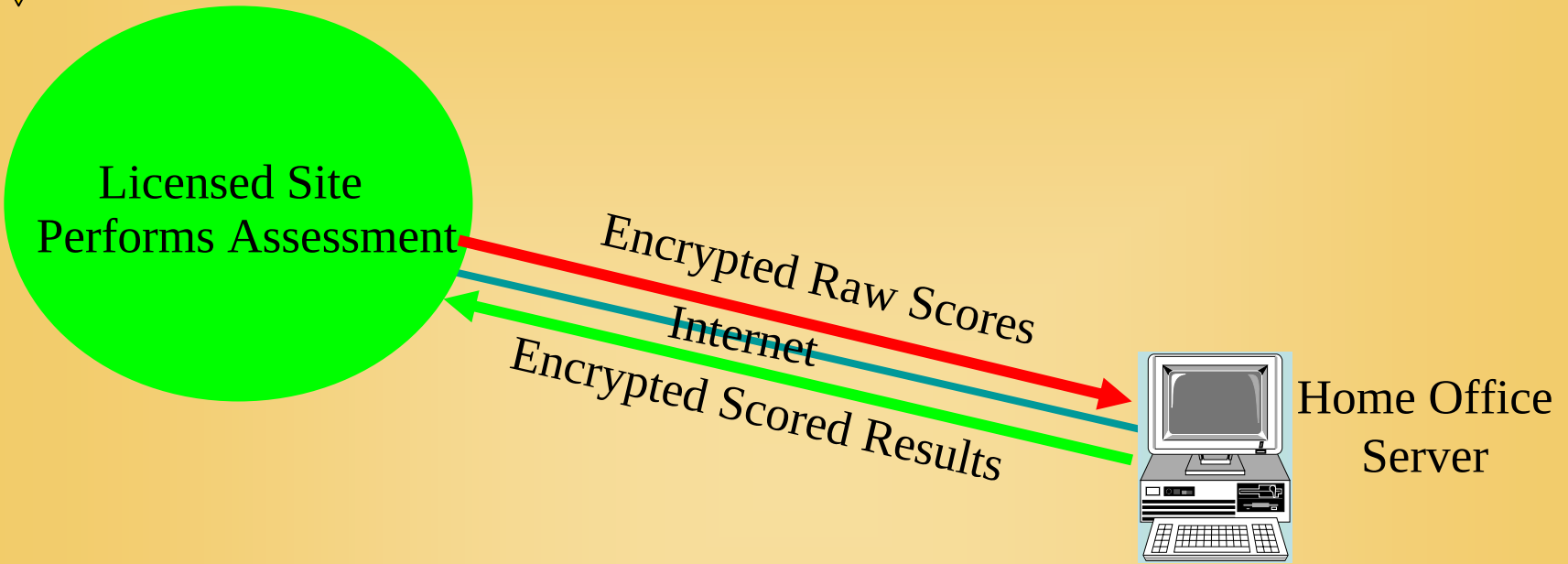
Critical step:

Must have demonstrated fairness and accuracy.

DriveABLE
Driven by Research

Evaluating the Medically at Risk Driver

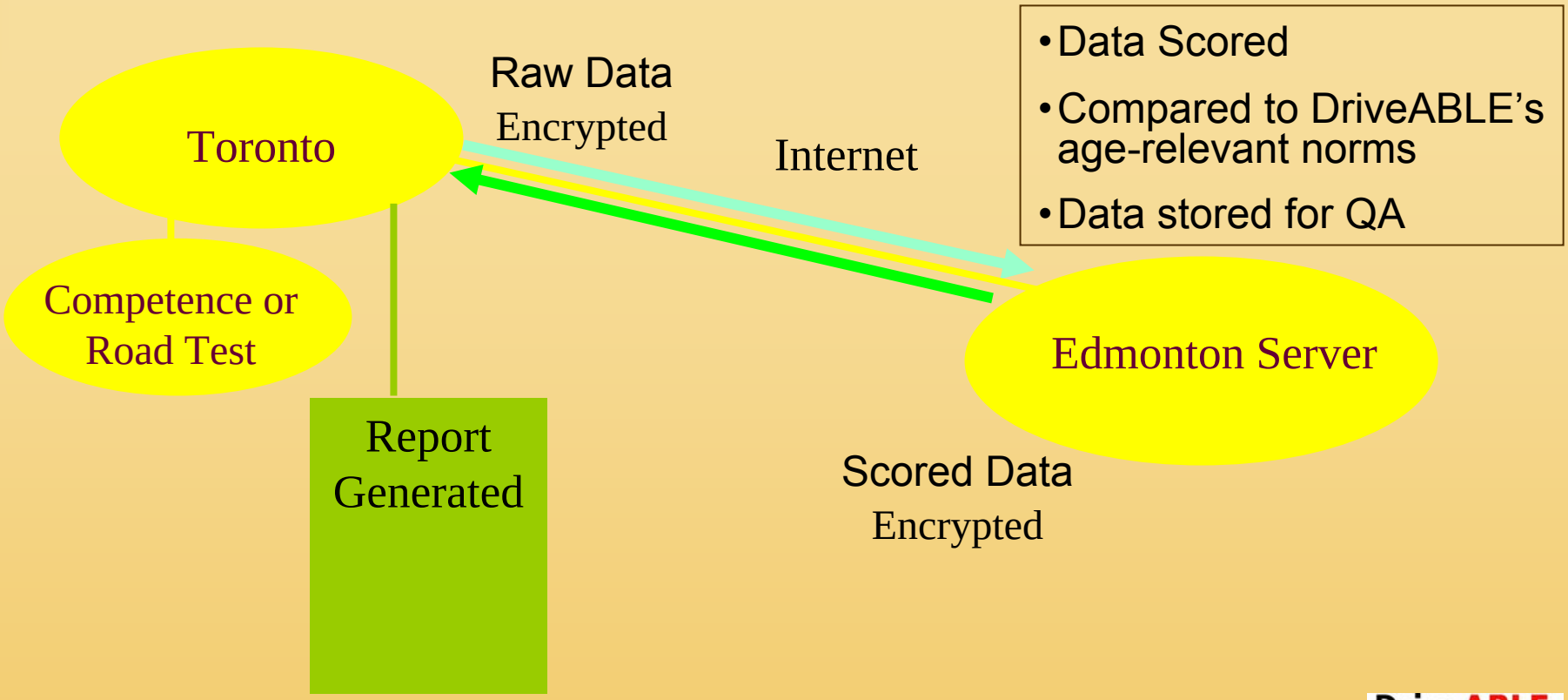
The DriveABLE Model



- Data are automatically scored
- Scores combined using proprietary algorithms
- Compared to DriveABLE's age-relevant norms

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

RT Quality Assurance Monitoring



The DriveABLE Model

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

RT Quality Assurance Monitoring

1. Calibrated relationship between External Criterion and Road Test outcome must be maintained.

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

RT Quality Assurance Monitoring

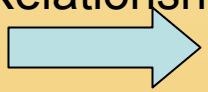
2. Driving Evaluator judgment standard.

After every drive, driving evaluator makes ratings.

Evaluators Ratings of Facets

- Left turning
- Right turning
- Defensive Driving
- Etc.

Evaluate Relationship



Evaluators Error Severity Ratings

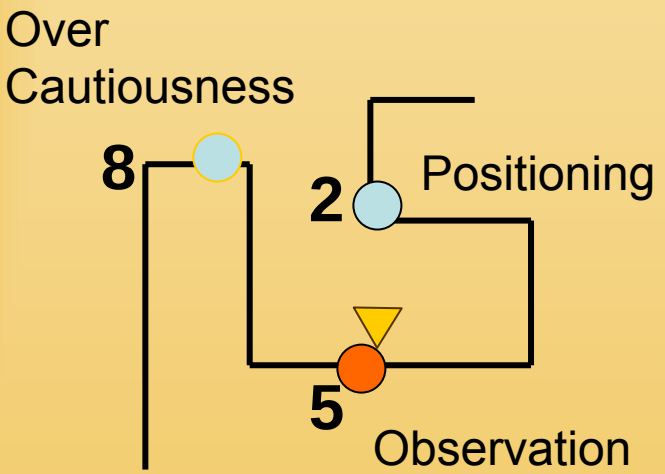
- Turning errors
- Positioning errors
- Observation errors
- Etc.

DriveABLE
Driven by Research

Evaluating the Medically at Risk Driver

RT Quality Assurance Monitoring

4. Driving Evaluator Scoring of Error-types:

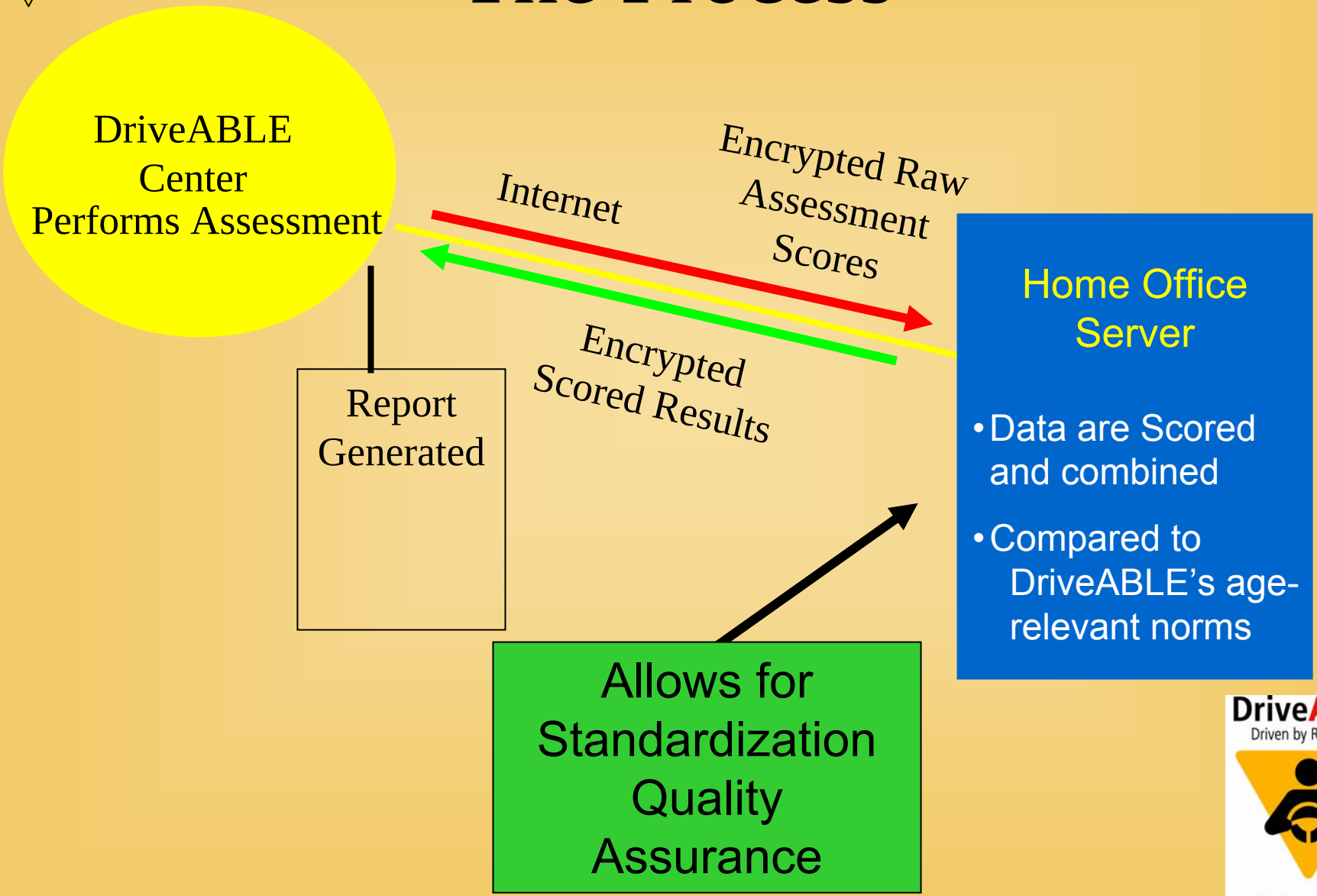


Site's Data Summary

Road Course Position	Error Types Pos.	Obs.	Caut.	etc
1	X			
2			X	
3		X		
4				
5	X			
6		X		
7				
8			X	
9				X
Etc.				

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

The Process



DriveABLE
Driven by Research

Evaluating the
Medically at Risk Driver

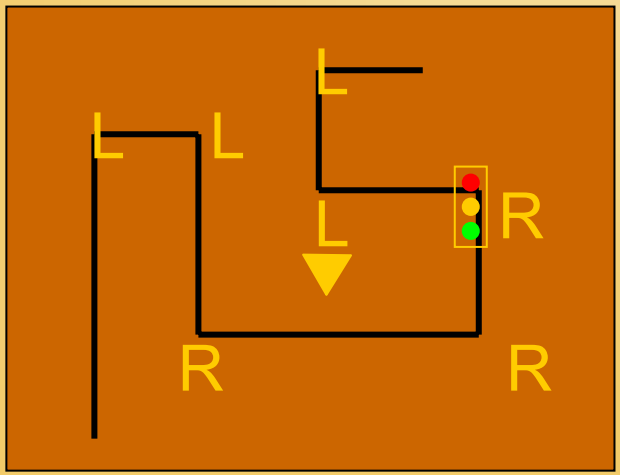
Monitoring for Quality Assurance

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Monitoring Standardization

Calibrated relationship between External Criterion and Road Test outcome *must be maintained*. Periodic monitoring ensures continued standardization.

External Criterion: Equal at all sites, known relationship to RT



Relationship must match standard, relationship needs to be maintained.

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Monitoring Quality Assurance

1. In-Office Assessment Administration: Evaluate the relationship among the 6 tests of the In-Office testing: Must remain the same.

2. On-Road Evaluation -- Standardization: Calibrated relationship between External Criterion and Road Test outcome must be maintained.

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Monitoring Quality Assurance

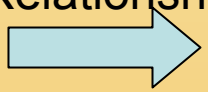
3. Driving Evaluator's judgment standard.

After every drive, driving evaluator makes ratings.

Evaluators Ratings of Facets

- Left turning
- Right turning
- Defensive Driving
- Etc.

Evaluate Relationship



Evaluators Error Severity Ratings

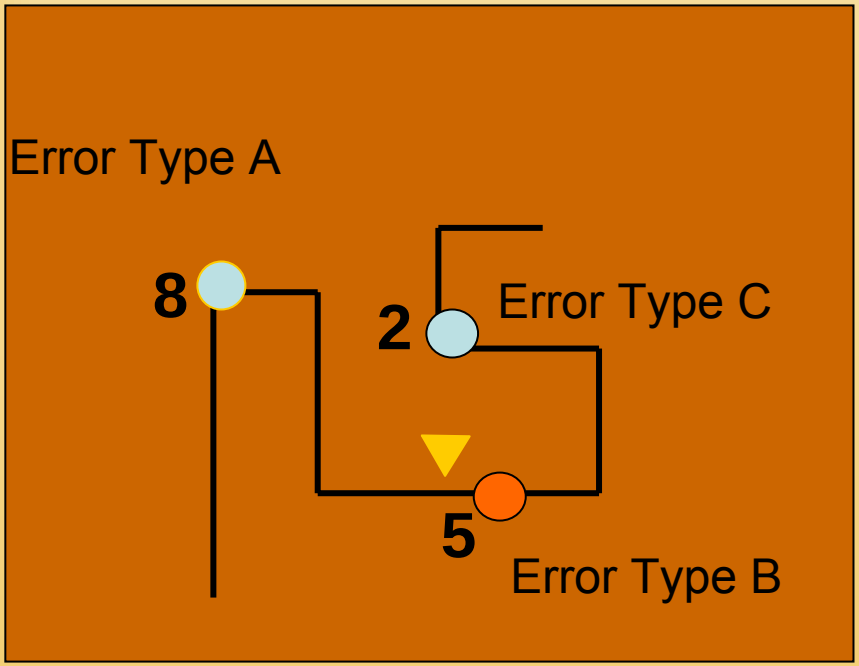
- Turning errors
- Positioning errors
- Observation errors
- Etc.

DriveABLE
Driven by Research

Evaluating the Medically at Risk Driver

Monitoring Quality Assurance

4. Driving Evaluator Scoring of Error-types:

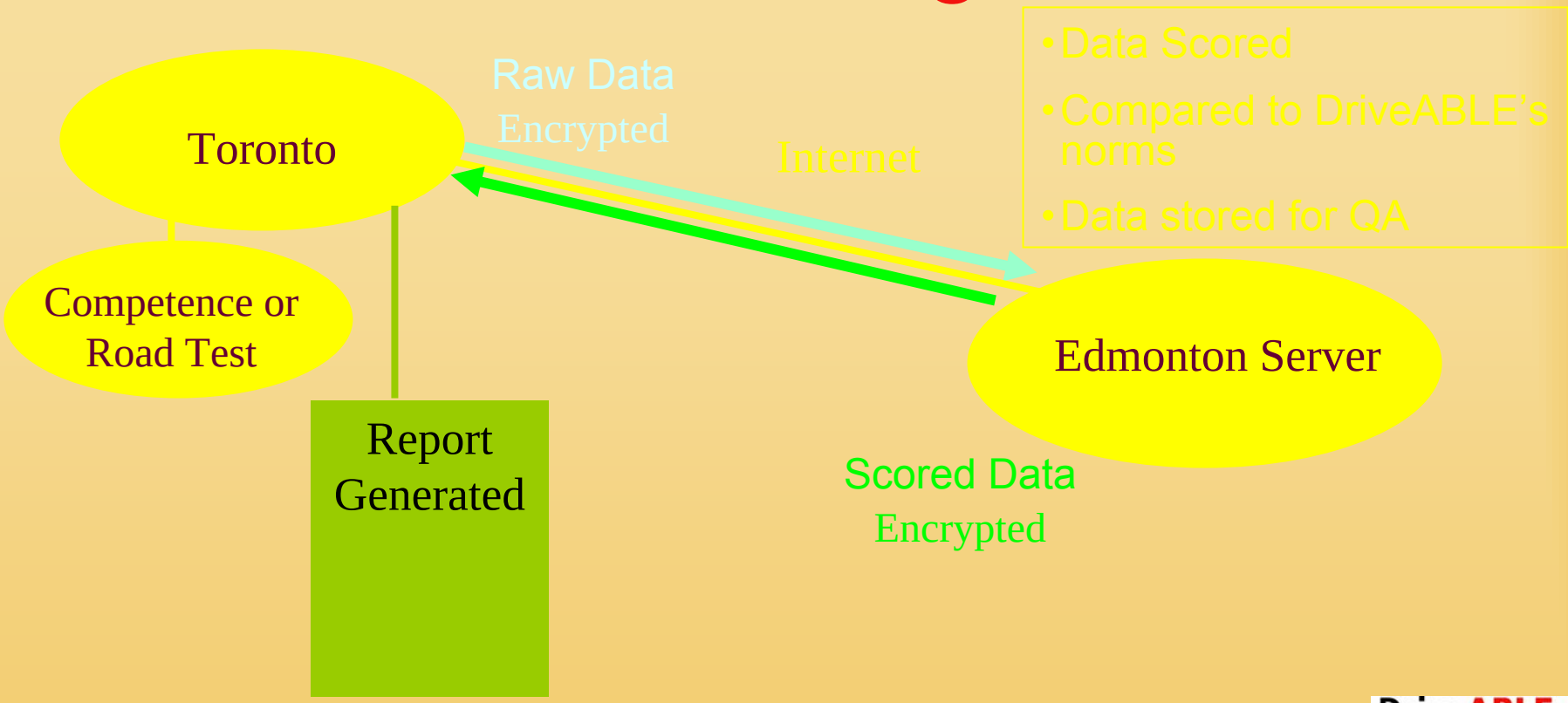


Edmonton Data Summary

Road Course Position	Error Types A	B	C	etc
1				
2	x			
3				
4				
5		x		
6				
7				
8			x	
9				
Etc.				

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

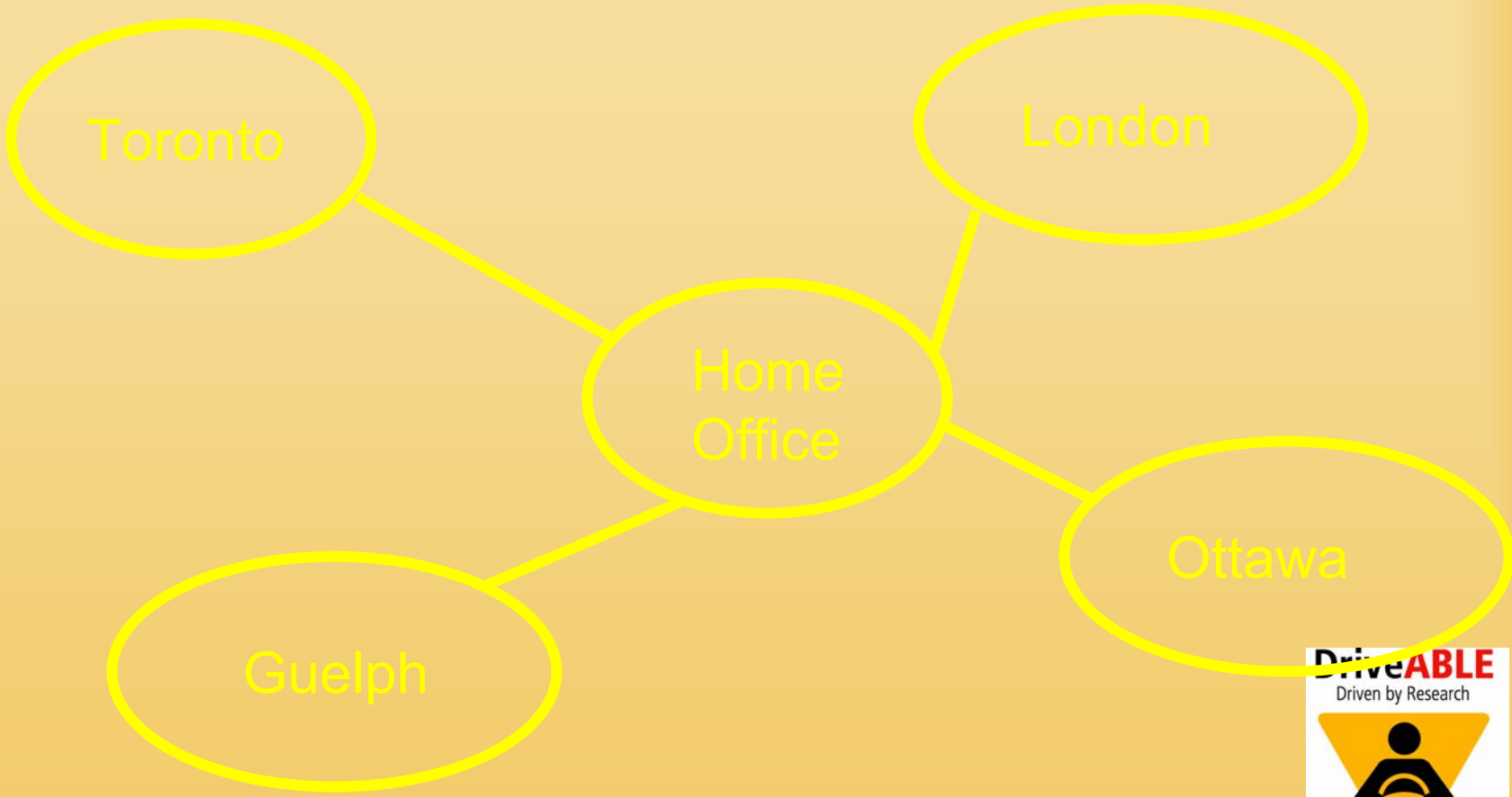
RT Quality Assurance Monitoring



The DriveABLE Model

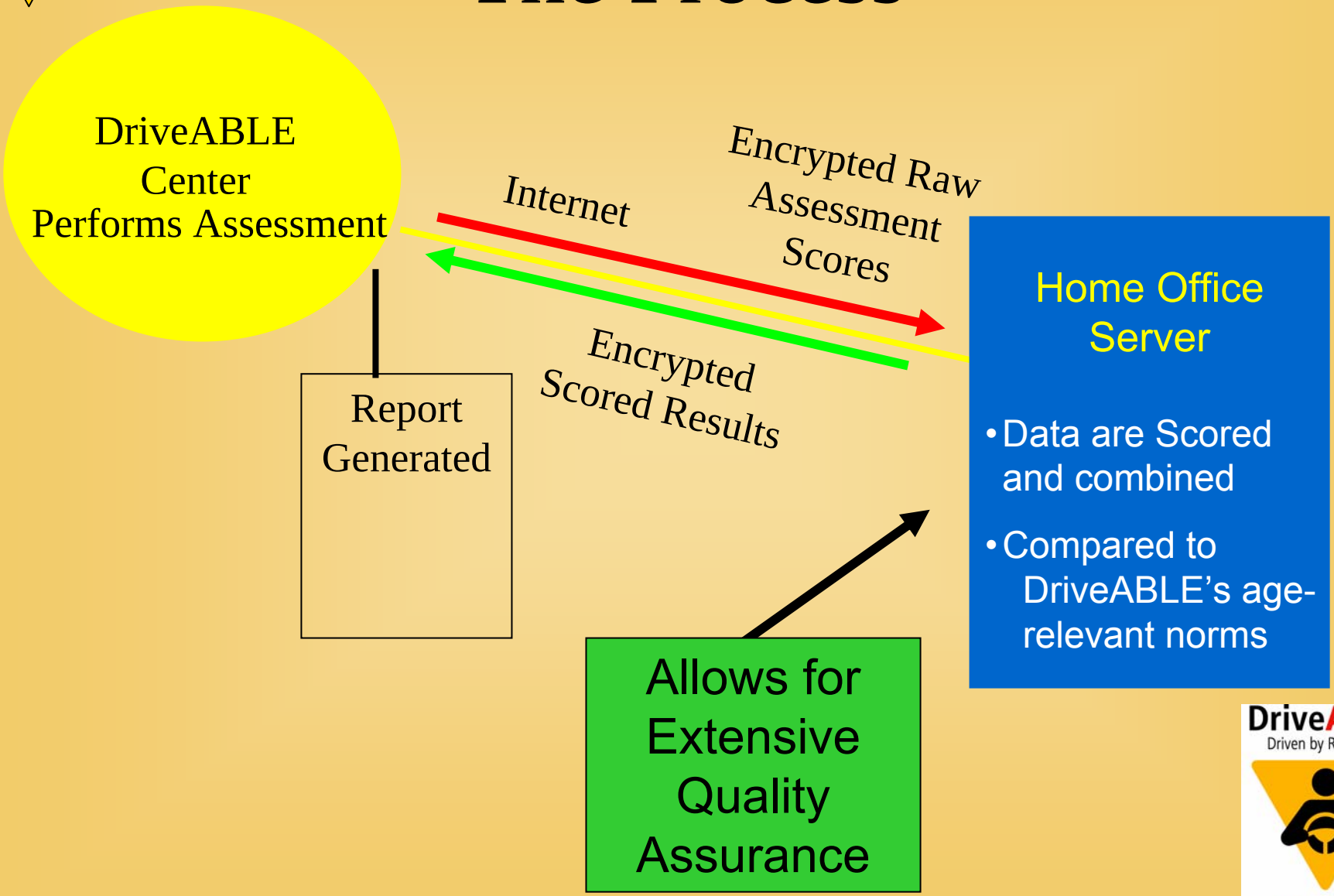
DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

RT Quality Assurance Model



DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

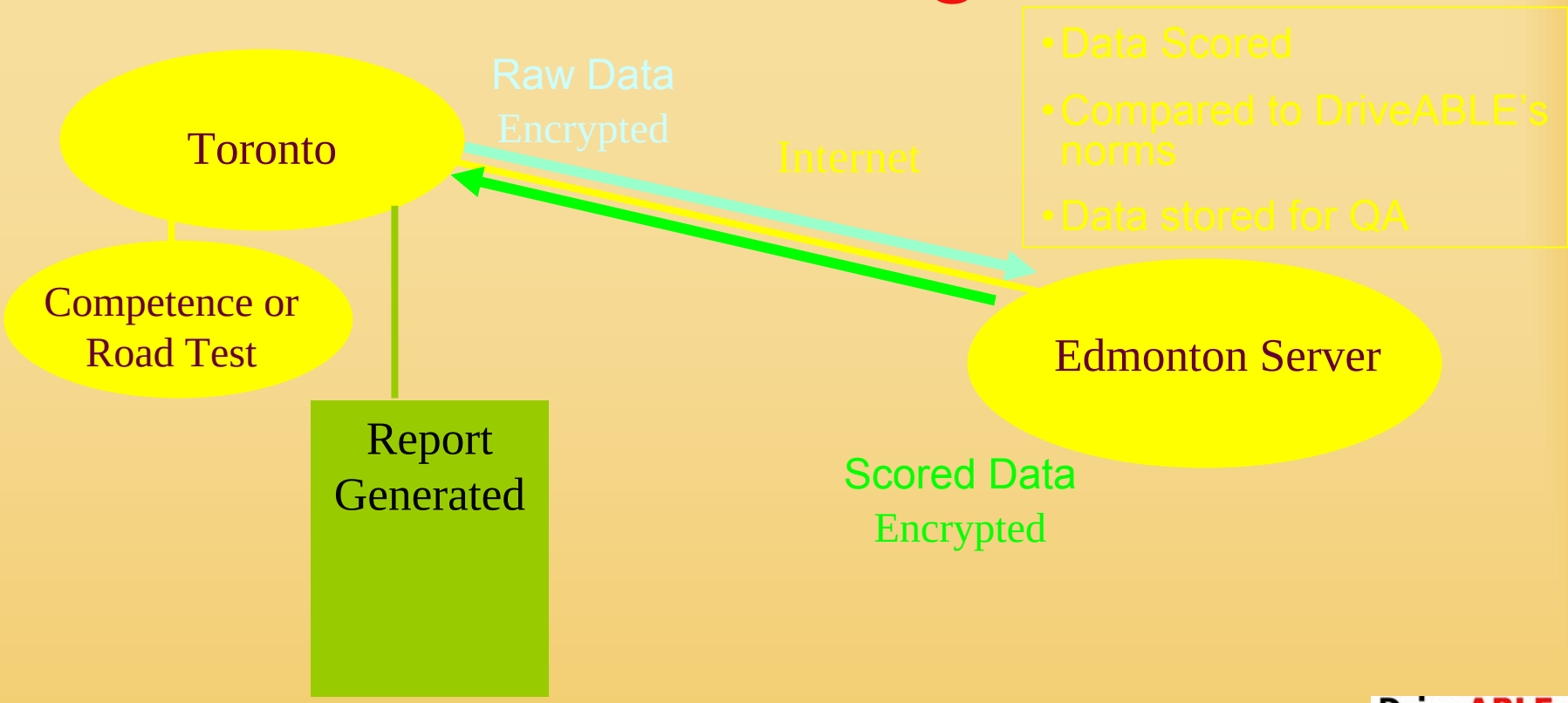
The Process



DriveABLE
Driven by Research

Evaluating the
Medically at Risk Driver

RT Quality Assurance Monitoring



The DriveABLE Model

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

“Packaging’ the Assessment

Alberta Heritage Foundation for Medical Research (AHFMR)

University of Alberta

Encouraged knowledge transition:

Research ➡ Practice

AHFMR, NRC IRAP assisted in development of University of Alberta spin-off company -- DriveABLE

‘Packaging’ required attention to Standardization and Quality Assurance procedures.

DriveABLE
Driven by Research

Evaluating the Medically at Risk Driver

Validation Study

- Extended new sample inclusion criteria to include drivers:
  - From across driving age range
  - With other medical conditions that result in generalized cognitive decline.

    (Including: Cardiac disease, COPD, Renal disease, Diabetes, Stroke, CVA, Psychiatric illness)
  - Referrals from community physicians as well as specialists

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Validation Study

- Extended new sample inclusion criteria to include drivers:
  - From across driving age range
  - With other medical conditions that result in generalized cognitive decline.

    (Including: Cardiac disease, COPD, Renal disease, Diabetes, Stroke, CVA, Psychiatric illness)
  - Referrals from community physicians as well as specialists

DriveABLE
Driven by Research

Evaluating the Medically at Risk Driver

Original Study Findings

Criterion Errors

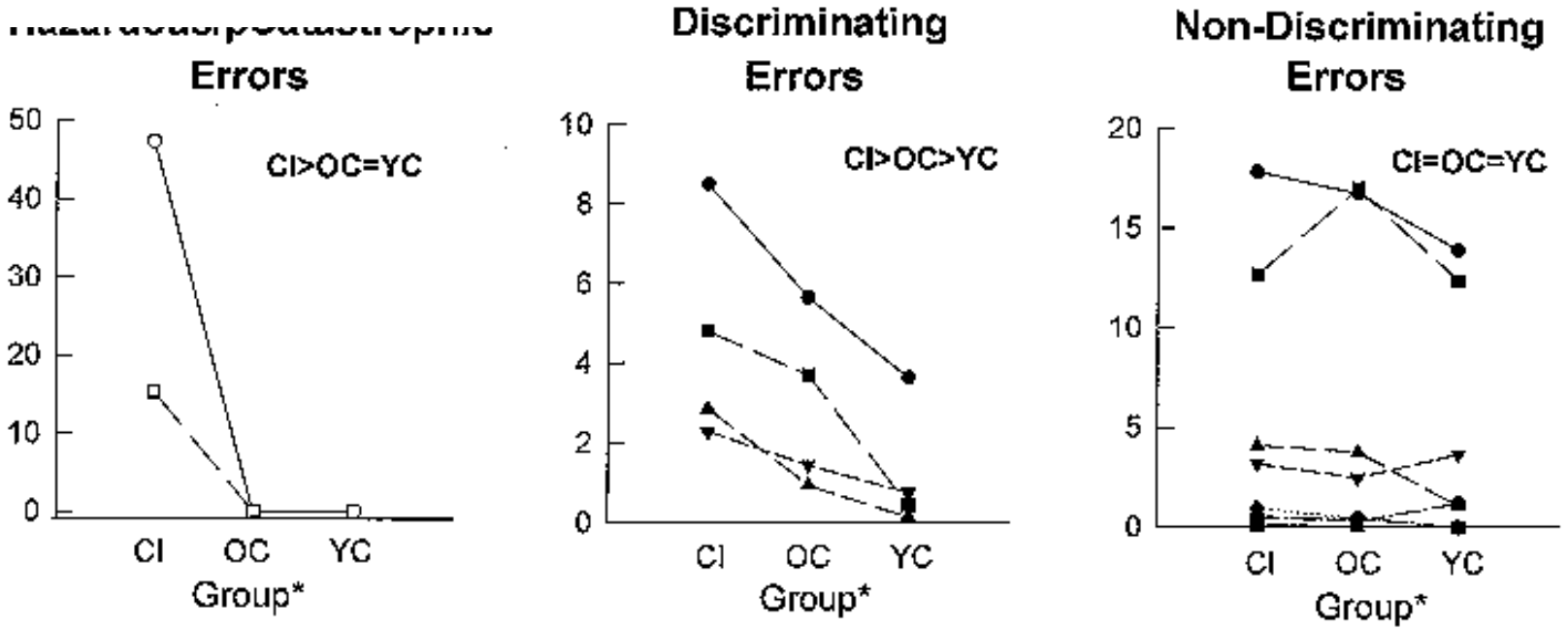


Fig. 1. Three groupings of error categories isolated by ANOVA.

*CI = Cognitively Impaired, OC = Old Controls, YC = Young Controls

Validation Study

Criterion Errors

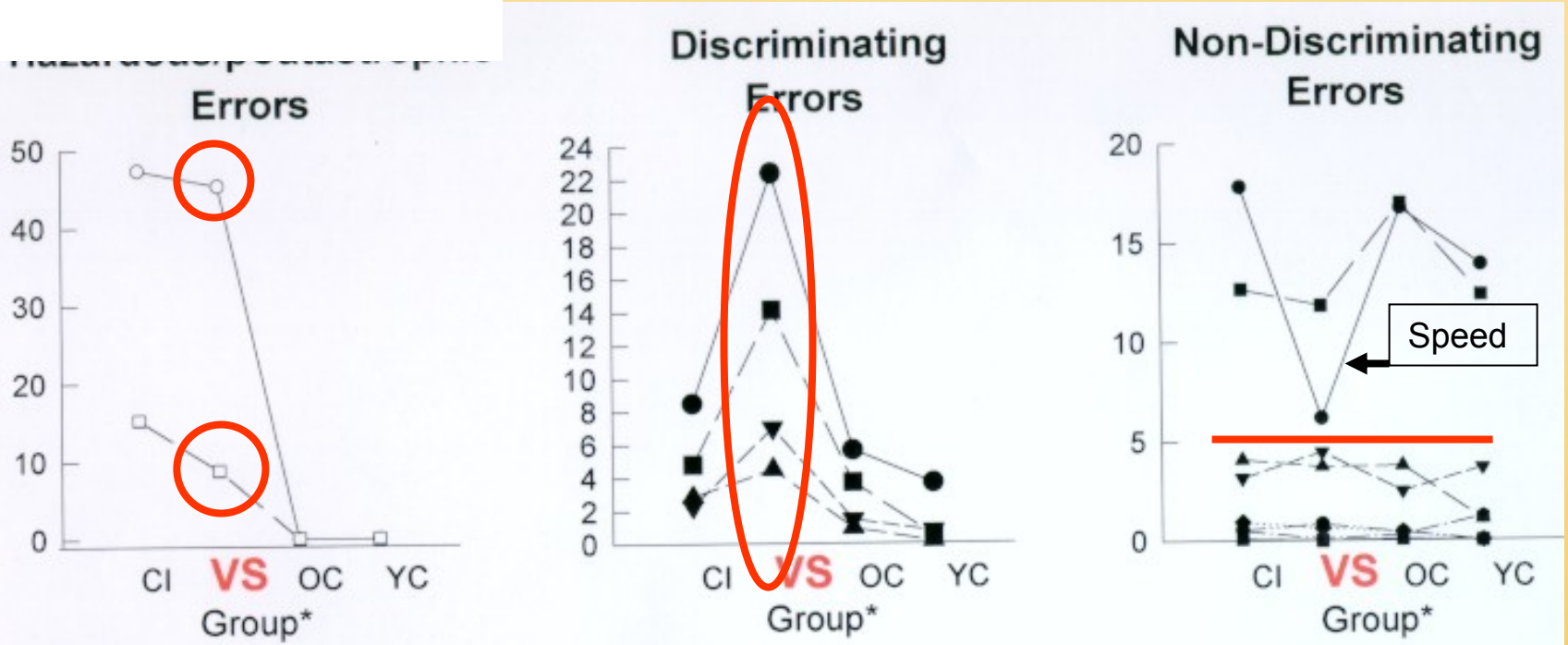


Fig. 2. Three groupings of error categories isolated by ANOVA.

*CI = Cognitively Impaired, OC = Old Controls, YC = Young Controls, all from the original study.

VS identifies the group from the Validation Study.

Evaluating the Medically at Risk Driver

Standardization

What is it?

Equal outcome across clients, across evaluators, and across sites.

Driving as a '**hard**' example:

Driving errors and other performance measures = Symptoms

Road course is the 'tool'

Pass/Fail is the 'diagnostic' criterion

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Standardization

- What is it?
- Equal outcome across clients, across evaluators, and across sites.
- Driving as a '**hard**' example:

Driving errors and other performance measures = Symptoms

Road course is the 'tool'

Pass/Fail is the 'diagnostic' criterion

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Standardization

- What is it?
- Equal outcome across clients, across evaluators, and across sites.
- Driving as a '**hard**' example:

Driving errors and other performance measures = Symptoms

Road course is the 'tool'

Pass/Fail is the 'diagnostic' criterion

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Road Course Difficulty

- If course difficulty differs from site to site, can not justify the outcome for any driver.
  - Driver could have had a different outcome at a different site.

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

The Elements of Standardization

- Training to a standard.
- Quality Assurance to insure standard maintained.
- Scoring (Performance measurements).
- Road Course (What is used to elicit the performance).
- Pass/Fail Criterion (Performance criterion).

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Road Course Standardization

Almost without exception, the difficulty of any two road courses will differ in difficulty.

Questions:

- How would you know?
- What could be done to equate?

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

DriveABLE's External Criterion

DriveABLE has an In-office Competence Assessment.

Always the same at each site.

External to the road test.

Relationship between Competence Assessment and Road Test performance has been determined.

Initially, all clients complete both the In-Office Competence Assessment and Road Test .

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Measuring Road Course Difficulty

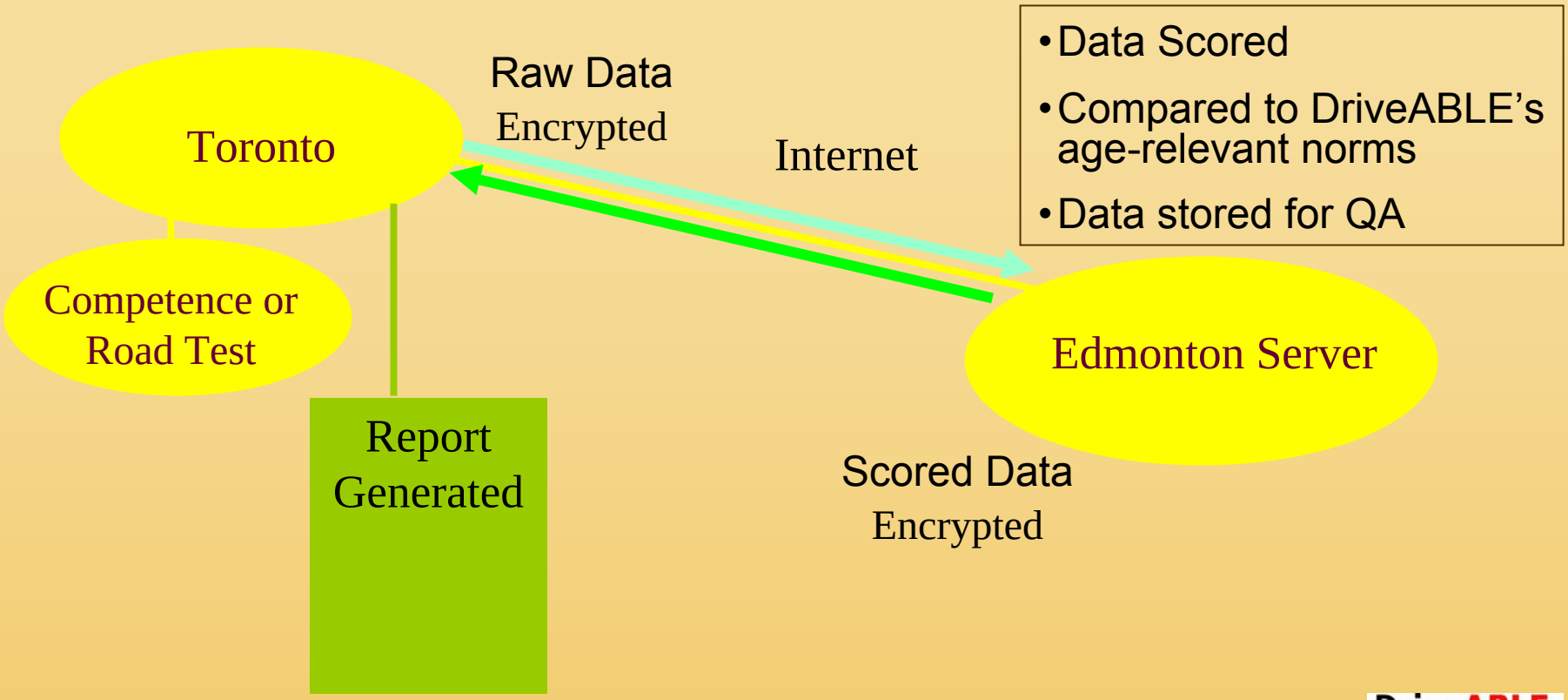
Given the performance on the Competence Assessment for a group of clients:

a) If the fail rate is too high, the RT is more difficult than the standard and the points needed to fail (driving errors plus severity) is adjusted upward to accommodate the higher difficulty.

b) If the fail rate is too low, the RT is less difficult than the standard and the fail criterion is adjusted to accommodate the lower difficulty (fewer driving error points required to fail).

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

RT Quality Assurance Monitoring



The DriveABLE Model

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

RT Quality Assurance Monitoring

1. Calibrated relationship between External Criterion and Road Test outcome must be maintained.

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

RT Quality Assurance Monitoring

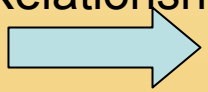
2. Driving Evaluator judgment standard.

After every drive, driving evaluator makes ratings.

Evaluators Ratings of Facets

- Left turning
- Right turning
- Defensive Driving
- Etc.

Evaluate Relationship



Evaluators Error Severity Ratings

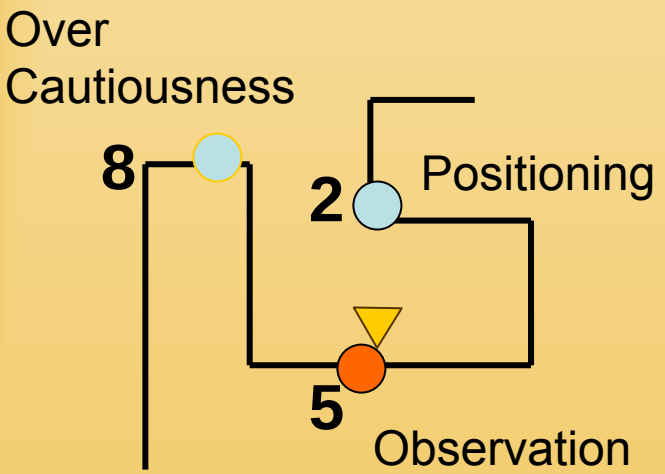
- Turning errors
- Positioning errors
- Observation errors
- Etc.

DriveABLE
Driven by Research

Evaluating the Medically at Risk Driver

RT Quality Assurance Monitoring

4. Driving Evaluator Scoring of Error-types:



Site's Data Summary

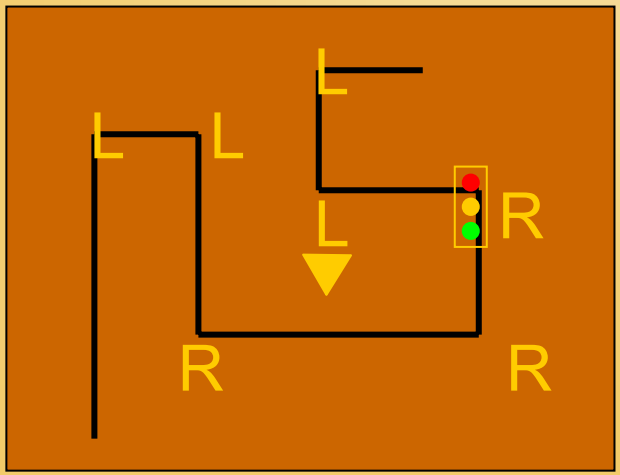
Road Course Position	Error Types Pos.	Obs.	Caut.	etc
1	X			
2			X	
3		X		
4				
5	X			
6		X		
7				
8			X	
9				X
Etc.				

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Monitoring Standardization

Calibrated relationship between External Criterion and Road Test outcome *must be maintained*. Periodic monitoring ensures continued standardization.

External Criterion: Equal at all sites, known relationship to RT



Relationship must match standard, relationship needs to be maintained.

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Monitoring Quality Assurance

1. In-Office Assessment Administration: Evaluate the relationship among the 6 tests of the In-Office testing: Must remain the same.

2. On-Road Evaluation -- Standardization: Calibrated relationship between External Criterion and Road Test outcome must be maintained.

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Monitoring Quality Assurance

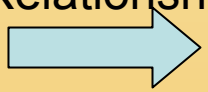
3. Driving Evaluator's judgment standard.

After every drive, driving evaluator makes ratings.

Evaluators Ratings of Facets

- Left turning
- Right turning
- Defensive Driving
- Etc.

Evaluate Relationship



Evaluators Error Severity Ratings

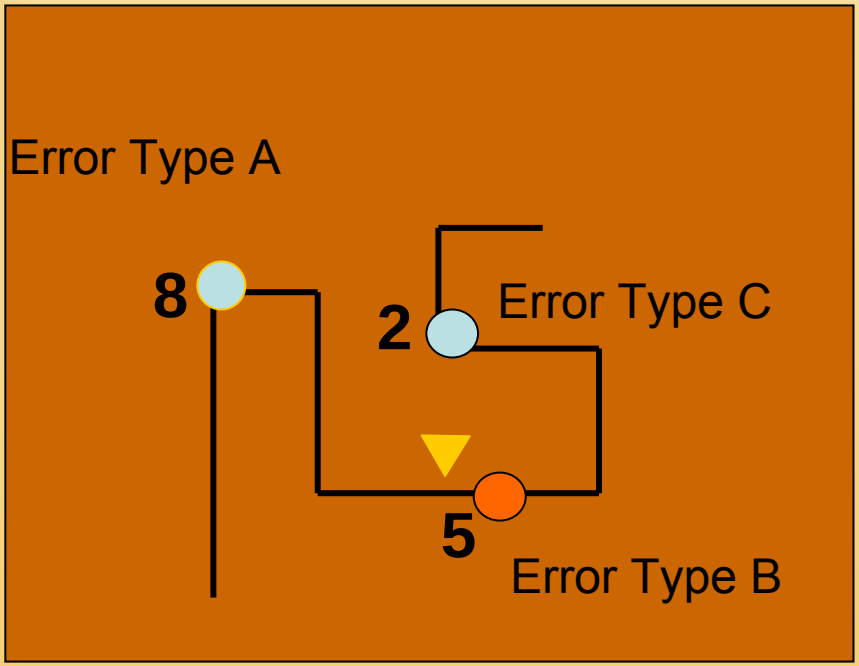
- Turning errors
- Positioning errors
- Observation errors
- Etc.

DriveABLE
Driven by Research

Evaluating the Medically at Risk Driver

Monitoring Quality Assurance

4. Driving Evaluator Scoring of Error-types:



Edmonton Data Summary

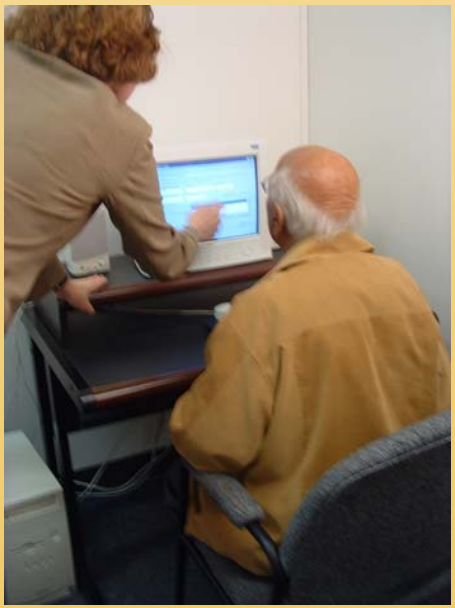
Road Course Position	Error Types A	B	C	etc
1				
2	x			
3				
4				
5		x		
6				
7				
8			x	
9				
Etc.				

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

The DriveABLE™ Assessment

In-Office Assessment

- Computer presented, Client friendly
- Validated to identify most dangerous drivers

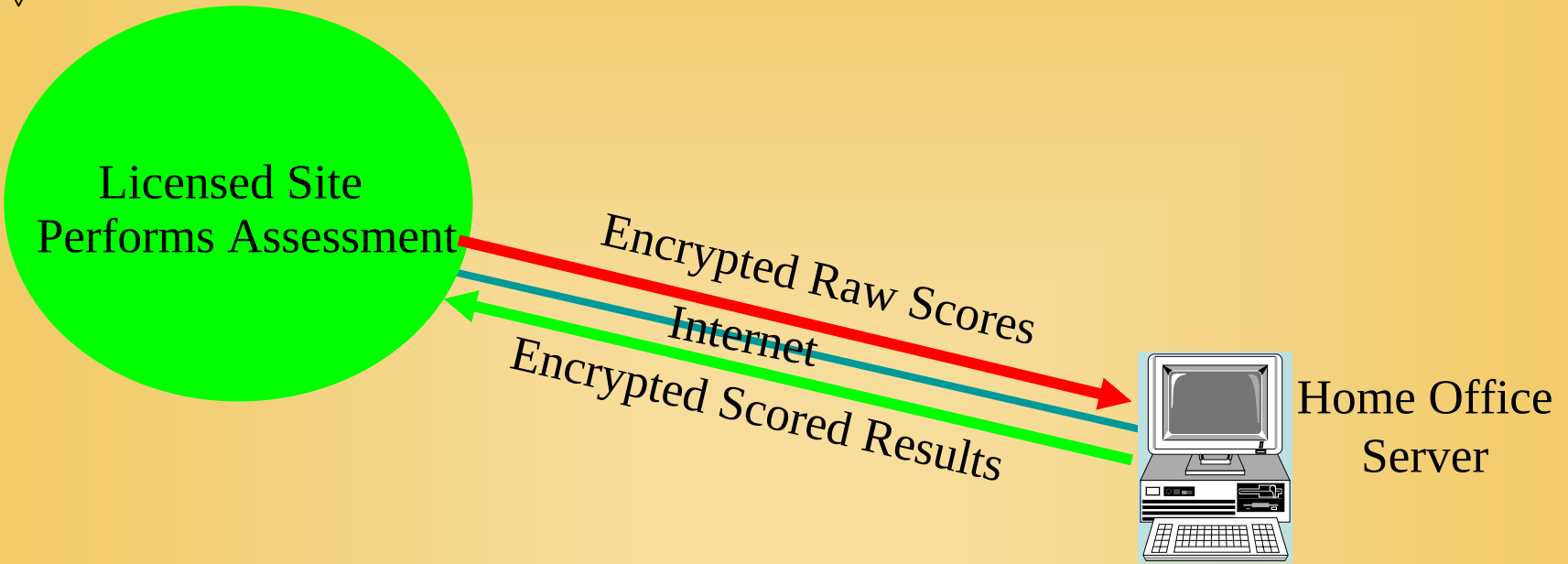


In Car Evaluation

- Only competence defining errors scored
- Equally fair for urban & rural drivers
- Standardized

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

The DriveABLE Model



- Data are automatically scored
- Scores combined using proprietary algorithms
- Compared to DriveABLE's age-relevant norms

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Two categories of medical condition outcomes

Sporadic, debilitating events
[e.g. Seizure, Unstable Cardiovascular diseases, Sleep Disorders, Diabetes (hypoglycemic reaction)]

Chronic, outcomes
[e.g., Dementia, COPD, Renal Disease, Diabetes Mellitus, Head injury]

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Two categories of medical condition outcomes

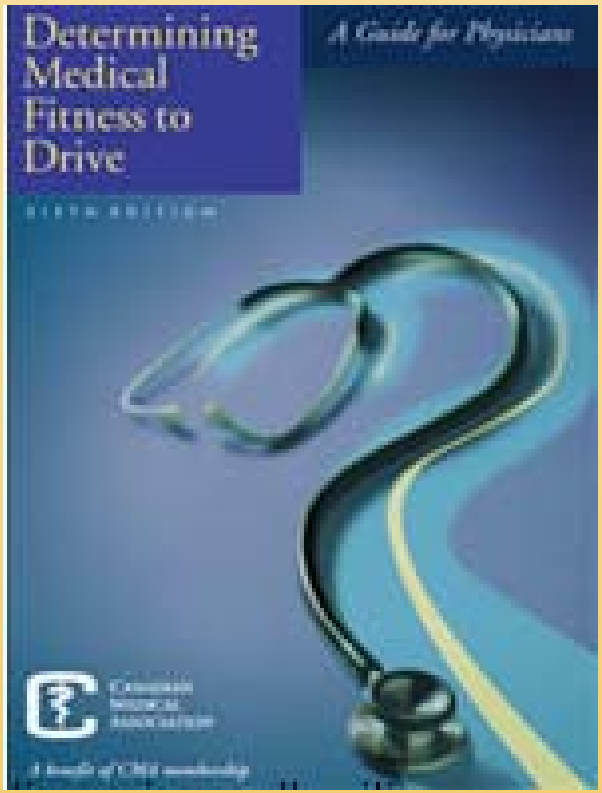
Sporadic, debilitating events [e.g. Seizure, Unstable Cardiovascular diseases, Sleep Disorders, Diabetes (hypoglycemic reaction)]

No question about driving ability when event occurs.

Assessment question is the likelihood of the event.

Judgment about the risk level.

Science unlikely, consensus guidelines = Best Practice



DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Two categories of medical condition outcomes

Sporadic, debilitating events [e.g. Seizure, Unstable Cardiovascular diseases, Sleep Disorders, Diabetes (hypoglycemic reaction)]

No question about driving ability when event occurs.

Assessment question is the likelihood of the event.

Judgment about the risk level.

Science unlikely, consensus guidelines = Best Practice

CMA Guidelines

"… the recommendations remain mainly empirical [relying on experience or observation alone] and represent that the driving standards are based on the consensus opinion of an expert panel…" [page 4]

"They are intended to impose no more than common sense restrictions on drivers with medical disabilities." [page 4]

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver

Two categories of medical condition outcomes

Sporadic, debilitating events [e.g. Seizure, Unstable Cardiovascular diseases, Sleep Disorders, Diabetes (hypoglycemic reaction)]

Chronic, outcomes [e.g., Dementia, COPD, Renal Disease, Diabetes Mellitus, Head injury]

No question about driving ability when event occurs.

Assessment question is the likelihood of the event.

No question about the event, it is ongoing.

Assessment question is the ability of the driver.

Judgment about the risk level.

Stable illness outcome is measurable.

Science unlikely, consensus guidelines = Best Practice

Science possible, science-based evidence = Best Practice

DriveABLE
Driven by Research
Evaluating the Medically at Risk Driver